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SPECIFIC FEATURES OF THE STRUCTURE OF A TECHNICAL AND TACTICAL ARSENAL OF NON-OLYMPIC SINGLE COMBATS OF AN IMPACT TYPE AND A WAY OF ITS IMPROVEMENT

Abstract. Purpose: identify key differences in technical operations and tactical combat potential ways to implement popular athletes in combat shock type, applying for entry into the Olympic Games. Material and Methods: distinctions of sports technique and tactics in duels in karate, taekwondo, kickboxing and Thai boxing were estimated by the expert group. The arsenal of technical and tactical actions of sportsmen was analyzed at competitions of various levels. Results: essential distinctions in competitive exercises, estimated criteria of refereeing, the structure and the arsenal of the applied sports technique and tactics are revealed in chosen for the research types of impact single combats. Conclusions: essential differences in the technical – tactical arsenal of the studied types of impact single combats which are shown in the topography of zones allowed for drawing, the structure of attacking and protective actions, and also tactical stylistics of carrying out duels.

Keywords: sports training, karate, competitive activity, methodology, competitive exercises.

Introduction. Non-Olympic single combats of an impact type as effective remedies of physical training and a version "sport for everybody" gained a wide popularity in the second half of the XX century. The foundation to it was laid by the successful distribution of karate over the countries of Europe, having created necessary prerequisites of acquaintance of the western society to centuries-old traditions of Far – Eastern martial arts. Soon Korean taekwondo and Chinese wushu received the popularity. A bit later Thai boxing involved the interest of experts which had an essential impact on the development of contact single combats of the beginning of the XI century. Kickboxing is taken the special place among single combats of an impact type which is a synthetic sport in which sportsmen and coaches seek to unite the best technical – tactical elements of national types. The above-mentioned single combats of an impact type often surpass some Olympic sports in the popularity and the number of training sportsmen of the various level of preparedness.

Experts of the theory of sport and coaches of high qualification connect prospects of the further development of impact types of single combats with the growth of competitive skill of sportsmen, which is indissolubly with the scientific validity of the training process. The necessity of the research of the competitive and

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training activity is caused by also modern requirements to versatile preparation of the qualified coaches' specialists which are perfectly know a technique of leading of sportsmen of high level to a condition of the highest combat preparedness. The description, the classification, the analysis and the assessment of the efficiency of competitive exercises, technical elements and tactical schemes of a competitive fight are a necessary link for the optimization of system of sports preparation of impact types of single combats at the present stage of their development.

There are a lot of publications are devoted to a problem of the optimization of technical and tactical preparation in single combats of an impact type in scientific and methodical literature \[1; 3; 4; 11; 13\]. In these works authors, using a complex of effective research approaches to data acquisition about the competitive and training activity in single combats, estimate the productivity of the applied technical actions and specify the possible directions of the increase of the competitive opportunities of sportsmen. In works \[2; 5; 12\] the structure of the applied technical-tactical actions in karate is investigated and in our opinion perspective and methodologically justified attempts of classification of sports technique and tactics of maintaining a competitive single combat are become. Works of V. V. Romanenko, A.S. Rovnyi (2009) and Yu. B. Kalashnikov (2009) are devoted to a problem of use of reference technique of Taekwondo for the improvement of technology of the performance of the main fighting receptions at various stages of the sports improvement. In several works questions of a specific adaptation of sportsmen to physical and mental activities in oriental martial arts and Thai boxing are revealed \[6; 7\]. It should be noted the lack of works in which the complex analysis and the comparison of technique and tactics of different types of single combats is carried out depending on the existing rules of competitions.

**The objective of the research:** the detection of key differences in technical actions and tactical ways of realization of fighting potential of sportsmen in the popular single combats of impact type applying for the entry into the program of the Olympic Games.

**Material and methods of the research:** pedagogical supervision, theoretical analysis and synthesis of these references.

**Results of the research and their discussion.** Manifestation of technical-tactical potential of sportsmen in the conditions of the competitive activity is closely connected with features of rules of competitions. Arsenal of techniques is regulated in rules the admissible to application in competitive single combats, and criteria of estimation of military operations of sportsmen are established. It is obviously important to note that, there are always steady traditions in treatment and estimation of competitive actions of sportsmen besides the official rules of competitions, in sports which don't have an opportunity to express achievements of sportsmen in accurately established units of measure. In the course of the organization of the system of sports preparation the qualified coaches consider the set of the dominating external and internal factors causing the productivity of speech of their sportsmen at preparatory, minor and main competitions. It should be noted the existence in each of them of the developed steady stereotype of conducting a competitive fight in view of rather long period in the development of the types of single combats chosen by us for the research.
Modern karate came from Okinavskiy styles of maintaining a single combat without a weapon which had an originally exclusively applied character. Tactics of the application of methods of Okinavskiy karate was formulated by fighters as follows: "at one kick is on the spot" that assumed a choice of the successful moment for attack with the subsequent infliction of a powerful accented kick. Unsuccessful attack could end with death as counteracted the fighter or the armed pirates, or Samurais trying to colonize Okinawa on a certain historical piece.

The commitment of the Japanese society to traditions had an essential effect on the formation of rules of competitions of modern karate. Single combats pass in the facilitated protective equipment. The task of a sportsman is to strike a kick first corresponding to the established criteria. It is possible to attack a head and a trunk. Kicks in a head are designated (or are put with the minimum contact), kicks in a trunk are allowed being strong, but controlled one. After the ended fighting episode of a referee stops a single combat and shows the test points or penal estimates appropriated to sportsmen for the violation of the rules. Kicks by feet to a head are estimated by high points. The most productive are direct kicks by hands in a trunk and circular kicks by feet.

It was supposed that there will be approximately equal ratio of the struck kicks by hands and by feet in a single combat at the beginning of the development of sports karate by theorists of this type of single combat. Researches of the competitive activity of karatekas, by the criterion of primary use of tactical ways of impact on the opponent, allow marking out three main technical- tactical styles of maintaining a single combat: offensive, defensive and maneuverable. The popularity of karate and the staginess of single combats in many respects promoted that karate WKF was several times considered by the International Olympic Committee as the applicant for the inclusion in the program of the Olympic Games.

In the sport having a North Korean origin taekwondo ITF are resolved kicks by hands and by feet in a trunk and a head. Korea during a certain period of the history strongly suffered from the aggressive militaristic policy of Japan and the concept of the formation of a national type of single combats assumed the rules of conducting competitive fight which are very different from rules of competitions in karate. Single combats pass without stopping for charge of test points that gives to actions of fighters a big dynamics and a variety in application of fighting movements. Referee’s estimates stimulate infliction a large number of high kicks by feet and kicks by feet in a jump. Biting high kicks by feet became "a business card" of modern taekwondo, giving it the staginess.

The powerful place is taken by repeated and dual kicks by feet in a fighting arsenal of taekwondists. The classical ratio of the struck kicks is respectively 70% and 30%in a single combat by feet and by hands. Experts and coach community note that now there is a steady tendency to increase in a share of kicks by hands. We connect it with the general growth of the popularity in the world of technology of prize-fighting. Most often classify by belonging to a certain technical and tactical scheme of maintaining a competitive single combat of taekwondists as "players", "tempoviks" and "universalists". Also other approaches to classification of technical-tactical styles in taekwondo are displayed in special literature. In our opinion, allocation of the attacking, counterattacking and protective styles of conducting competitive fight has the theoretical value and the high practical importance.
In kickboxing, the synthesis of technique of boxing which is in a general view and karate, rules of competitions assume some options of maintaining a single combat. The division of them on soft and tough sections is methodologically justified used by coaches at the organization of sports preparation. There were the most popular two sections – light – contact and full-contact in which kicks by hands from boxing and by feet from karate in ahead and a trunk were resolved in the first decade after the formation of kickboxing as a modern spectacular sport. However statistical data on the participation of sportsmen in All-Ukrainian and international competitions show that more popular are sections in which low circular kicks are resolved in recent years: low – kick – light, K-1 light, low – kick and K-1.

Considering technical-tactical features of two last sections it should be noted the greatest probability of inclusion them in the program of the Olympic Games. In these sections strong kicks by hands and by feet put with a sportsman in a head, a trunk and on feet are resolved and are estimated by referees. The analysis of the publications reflecting these studying of the competitive activity in kickboxing, and our own researches allow marking out four technical-tactical styles of maintaining a single combat: game (defeating), tempo, power (with a rate on a knockout) and universal. Stirs and inability prevent mainly to merger of world federations inclusion in the program of the Olympic Games of kickboxing dissociation. According to most of experts, the best Olympic prospects have two world federations: WAKO – is the closest approached the necessary standards of carrying out the international competitions and WTKA – is holding the most mass championships and World Cup and Cup of Europe. Analyzing tendencies in the development of world kickboxing, it is obviously important to assume that one of the leading federations will achieve in foreseeable prospect of the right to represent this sport at the Olympic Games, but in one of sections. The second will dominate in Non-Olympic sector of single combats of an impact type, giving the chance to compete at the high level to representatives of various sections, styles and schools of martial arts. Other federations either will be absorbed by undisputed leaders, or will stop the existence.

Thai boxing Muay Thai is quickly developed and has certain Olympic prospects. The second name "a fight of the eight" reflects the extensiveness of the technical arsenal allowed by rules – kicks can be struck with fists, elbows, raising a foot, a shin and knees to a head, in a trunk and to feet. The reference tactics of this sport assumes the power pressure upon the rival and makes the great demands of physical fitness of sportsmen. Strong kicks are estimated, and there are kicks and put on protection to offset, but shaken the rival. It is authorized to capture an opponent for removal him from a balance and restriction of possibility of protection with maneuvering. There is a hard work at a clinch in single combats: kicks by elbows and knees, twisting. A little development of this interesting sport constrains certain shortcomings of protective equipment: the lack of protection on knees and imperfect elbow pieces, and also features of rules of competitions among fans which represent the changed basic professional rules in small degree.

The conducted by us research of participation of sportsmen of Kharkov regional federation of kickboxing VTKA, Kharkov federation of oriental martial arts and Kharkov regional office of Federation of Okinavskiy Goju-ryu and Ryukyu Kobudu Jundokan of Ukraine in open regional tournaments, the championships and Cups of the Kharkov area on kickboxing of VTKA and Goju-ryu karate for 2014
allows to draw conclusions on some tendencies of the development of sports equipment of these sports. We analyzed the main indicators of distribution of sportsmen according to competitive sections of kickboxing of VTKA (tab. 1) and Goju-ryu karate (tab. 2).

<table>
<thead>
<tr>
<th>Soft sections</th>
<th>11,2</th>
<th>18,9</th>
<th>45,5</th>
<th>24,4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-contact</td>
<td>Light-contact</td>
<td>Low-kick-light</td>
<td>K-1-light</td>
<td></td>
</tr>
<tr>
<td>Tough sections</td>
<td>16,4</td>
<td>61,4</td>
<td>22,2</td>
<td></td>
</tr>
<tr>
<td>Full-contact</td>
<td>Low-kick</td>
<td>K</td>
<td></td>
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Conclusions:
1. Non-Olympic types of single combats of an impact type (karate of WKF, taekwondo ITF, kickboxing and Thai boxing of Muay Thai) in the popularity at the audience, to quantity training, the development of organizational structure and technical-tactical skill of sportsmen closely approached sports entering the program of the Olympic Games.

2. As a result of the research the essential differences in the technical-tactical arsenal of the studied types of impact single combats which are shown in the topography of zones of kicks allowed for infliction, the structure of the attacked and protective actions, and also the tactical stylistics of carrying out single combats are revealed.

3. The percentage ratio of number of the sportsmen who are taking part in the competitive sections of kickboxing VTKA provided by rules and Goju-ryu karate that allows the coach to consider an orientation of the educational-training process of preparation of sportsmen is defined.

4. The efficiency of the further development of the specified sports will be defined in many respects by results of scientific researches of various components of sports preparedness both the competitive activity and their practical use in the system of modern sports preparation.

Prospects of further researches. Conducting the comparative analysis of the efficiency of a technique of the increase of the competitive opportunities of sportsmen of high qualification is planned in single combats of an impact type in a year cycle of sports preparation.
References:

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COMPARATIVE ANALYSIS OF EFFICIENCY OF COMPETITION ACTIVITY OF MEN’S AND WOMAN’S BASKET-BALL TEEMS OF HIGH QUALIFICATION

Abstract. Purpose: to expose the specific lines of competition activity and define differences in realization of technique-tactical actions the basketball-players of high class ho playing in woman’s and men’s national teems. Material and Methods: for determination of characteristic features of competition activity of men’s and women’s, there was the analyzed information of competition activity of national teems, taking part in the matches of world cup 2014 years on basket-ball. Information of 24 men’s (240 athletes) and 16 (150 athletes) woman’s basket-ball teems were in general complication analyzed. Methods: analysis of data of the special scientific-methodical literature, pedagogical supervision, analysis of competition activity, an analysis of data is the Internet, methods of mathematical statistics. Results: It is set that on the row of technique-tactical actions (assists, steals of ball, rebounders in defense, turnovers, block-shots) men’s and woman’s national teems did not have reliable differences statistically. The conducted analysis show that men’s teems are in a match, do considerably less of throws from near and middle distance, however do much more throws amount of long distant at more high percent of their realization. Conclusions: in the actions of men’s teems, a greater accent is traced on the attack of basket from long distances. Men’s of all playing positions, have more high percent of realization of near throws in a match. Reliable distinctions on implementation of assists, steals, block-shots, between men’s and woman’s commands did not exposed. Keywords: competition activity, technique-tactical actions, different playing positions, coefficient of efficiency, model characteristic.

Introduction. The competitive activity in basketball differs in the variety and variability of actions, the continuous manifestation of ingenuity, and the set of factors and joint actions more than ten players influence on sports result directly. It considerably complicates an estimation of the competitive activity of sportsmen, from the accuracy and objectivity of which the efficiency of the process of management of the competitive activity and all sports preparation depends directly [1; 2; 6; 9].

A wide range of options of a competitive fight, a need of interaction with partners in a team, a continuous correction of tactical plans and actions considerably complicate the process of estimation of game actions of basketball players. Besides, sportsmen should carry out a large number of technical-tactical actions, each of which in turn, being shown in a difficult ensemble of a competitive fight, can affect the course of a sports duel, to predetermine its result [1; 4].
One of the actual directions of the researches in basketball is the definition of key components of providing and realization of the competitive activity of players of high qualification, the identification from a numerous arsenal of the technical-tactical activity of the leading indicators and characteristics which first of all define a success of a game of sportsmen and a team [3; 5; 8; 7].

In our opinion, the researches directed on the identification of leading elements of the structure of the competitive activity of basketball players of high qualification taking into account gender features are rather interesting. The detection of features of the competitive activity of men's and women's teams will allow reflecting the priority directions of the realization and the main accent in actions of sportsmen in a match. The comparison of the level of the realization of separate game actions and indicators by men's and women's teams, the establishment of distinctions by the efficiency and the specifics of the performance of technical-tactical actions between basketball players of different game role and another is represented also interesting.

**Communication of the research with scientific programs, plans, subjects.**
The work is performed within a research subject 2.3.1. «The argumentation of a modern system of selection and orientation of sportsmen in different types of sport» according to the Consolidating plan of RW in the sphere of physical culture and sport for 2011-2015.

**The objective of the research:** to reveal peculiar features of the competitive activity and to define differences in the realization of technical-tactical actions by high-class basketball players taking into account gender features.

**Material and methods of the research:** analysis of data of special scientific and methodical literature, pedagogical supervision, analysis of the competitive activity, analysis of data of Internet, methods of mathematical statistics. In the researches data of technical-tactical actions of the basketball players were analyzed, participating in the World Championship of 2014. In total data of 24 male and 16 female teams were analyzed.

**Results of the research and their discussion.** The technical – tactical actions which are used by experts today most often at the estimation of efficiency of the competitive activity of basketball players were analyzed for the solution of objectives of the research. The list of the used technical-tactical actions, make a traditional basis of official protocols of the competitions held under the auspices of the international federation of basketball (FIBA).

In total more than twenty game indicators and technical-tactical actions which can conditionally be divided into three main groups were used for the detection of specifics of the competitive activity of men's and women's teams: 1) throw indicators; 2) active game actions in defense and attack; 3) relative indicators and coefficients (pic. 1).
Pic. 1. The distribution of indicators of the competitive activity in basketball on groups taking into account the maintenance of an assessment

Data of the men's and women's national teams at the games of the World Championship of 2014 were used for carrying out the comparative analysis of the competitive activity. As a result of the conducted researches the model level of the realization of technical-tactical actions was established both for men's, and for women's basketball national teams. Model sizes were defined on the basis of the analysis of these all teams participating in a tournament (for men – 24 teams, 240 sportsmen for women – 16 teams, 150 sportswomen).

It is possible to see the results of these researches in pic.2, in which distinctions of women's and men's basketball teams are graphically presented by the efficiency of the realization of technical-tactical actions on the World Championship. The results of the men's national teams are given in the picture together with brackets in which the percentage difference with similar indicators of the women's teams is specified.
Pic. 2. The comparative efficiency of the realization of technical-tactical actions of men's and women's national teams in the World Championship in basketball of 2014

1 – gathered points in a match; 2 – realization of 2-point throws; 3 – realization of 3-point throws; 4 – realization of free throws; 5 – resulting passes of a ball; 6 – interceptions of a ball; 7 – rebounds in defense; 8 – rebounds in attack; 9 – total amount of rebounds of a ball; 10 – losses of a ball; 11 – blocked shots of a ball; 12 – fouls (personal remarks); 13 – effectiveness ratio (EFF)

So, the men's teams had a higher level of the realization 2-point (49,83±5,53 against 39,03±6,48) and 3-point throws (34,5±4,69 against 31,76±4,14) in championship matches. Thus it should be noted that the women's basketball teams made much bigger number of attempts of 2-point throws (61,16±4,69 against 40,07±4,76) in a match. The revealed distinctions have a statistically reliable character (tab. 1).

The men's teams, in turn, have the best indicators in the quantitative-qualitative relation on 3-point throws, i.e. do bigger quantity of throws in a match and have a higher percent of their realization authentically.

Analyzing features of the realization of throw indicators by men's and women's teams, it is possible to assume about the existence of the following tendency in general. Male teams do considerably smaller quantity of throws from a near and an average distance at higher percent of their realization in a match that as a result allows them to gather an approximately equal quantity of points with the women's teams at the expense of these throws. Thus the men's teams do much bigger quantity of distant (3-point) throws in a match at higher percent of their realization (tab. 1).
Table 1

The comparative analysis of the efficiency of the realization of technical-tactical actions by basketball players of high qualification of men's and women's teams in the World Championship of 2014

<table>
<thead>
<tr>
<th>Technical-tactical actions</th>
<th>Men (n=240) S±SD</th>
<th>Women (n=150) S±SD</th>
<th>p&lt;0,05</th>
</tr>
</thead>
<tbody>
<tr>
<td>The gathered points</td>
<td>75,53±8,76</td>
<td>64,05±11,90</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>2-point throws, hits</td>
<td>20,01±3,55</td>
<td>24,01±5,14</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>2-point throws, attempts</td>
<td>40,07±4,76</td>
<td>61,16±4,69</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Realization of 2-point throws</td>
<td>49,83±5,53</td>
<td>39,03±6,48</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>3-point throws, hits</td>
<td>7,54±1,34</td>
<td>5,11±1,14</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>3-point throws, attempts</td>
<td>21,97±3,38</td>
<td>16,28±3,98</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Realization of 3-point throws</td>
<td>34,5±4,69</td>
<td>31,76±4,14</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Free throws, hits</td>
<td>12,9±2,91</td>
<td>10,93±2,91</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Free throws, attempts</td>
<td>18,04±3,54</td>
<td>15,06±3,58</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Realization of free throws</td>
<td>71,16±4,76</td>
<td>72,74±6,64</td>
<td>–</td>
</tr>
<tr>
<td>Resulting passes</td>
<td>14,41±2,60</td>
<td>14,13±3,81</td>
<td>–</td>
</tr>
<tr>
<td>Interceptions of a ball</td>
<td>6,64±1,80</td>
<td>6,38±1,88</td>
<td>–</td>
</tr>
<tr>
<td>Rebounds of a ball in defense</td>
<td>24,65±3,36</td>
<td>25,99±5,17</td>
<td>–</td>
</tr>
<tr>
<td>Rebounds of a ball in attack</td>
<td>10,53±2,34</td>
<td>12,19±3,78</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Total amount of rebounds of a ball</td>
<td>34,40±5,56</td>
<td>38,19±7,79</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Losses of a ball</td>
<td>14,54±2,29</td>
<td>15,74±2,59</td>
<td>–</td>
</tr>
<tr>
<td>Blocked-shots of a ball</td>
<td>2,67±1,60</td>
<td>2,77±1,20</td>
<td>–</td>
</tr>
<tr>
<td>Personal remarks (fouls)</td>
<td>20,78±1,91</td>
<td>18,20±2,59</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Effectiveness ratio (EFF)</td>
<td>77,26±16,74</td>
<td>67,82±29,39</td>
<td>&lt;0,05</td>
</tr>
</tbody>
</table>

The priority in attack of a basket of the rival from a distant distance is traced in actions of the male teams. If to correlate these distinctions, than two attacks by a 2-point throw at the male teams are the share of one attack by a 3-point throw, and one attack from a distant distance are four attacks from an average and near distance at women, i.e. it is twice more. Also the men's teams carry out bigger quantity of free throws in a match. Obviously what exactly these features also define so essential difference in the number of points scored for a match. On average, the men's teams score 75,53±8,76 points during a match, and the women's – 64,05±11,90, p<0,05. It is also possible to note that the women's teams don't concede the men's, moreover, on a number of technical-tactical actions have the reliable advantage over men (rebounds in attack and total of rebounds of a ball) on other game indicators which basketball players carry out in defense and attack.

It is possible that the attempt of a direct comparison of data made in the real research and definitions on this basis of the primary efficiency of the competitive activity of the men's and women's national teams isn't correct. As the level of the realization of technical-tactical actions in many respects depends on who resists to a team in a match.

Despite it, nevertheless it is possible to note that the revealed features allow seeing specifics of the competitive activity in man's and woman’s basketball, to
consider these data when training sportsmen and further the estimation of efficiency of their competitive activity.

It is known that sportsmen carry out five main game functions on a platform in modern basketball: point guard, shooting guard, small forward, power forward and center. Each of game positions imposes specific requirements to the level of preparedness and sets certain game tasks for the sportsman. And this classification is accepted both in men’s and in women’s basketball by role. In the light of the real research the detection of distinctions between players of different role taking into account gender features was represented actual. The conducted researches showed that men and women have a similar tendency in the priority of the realization of technical – tactical actions in a match. The point guards and the shooting guards have the highest level of the realization of result passes and interceptions of a ball in a match, players of the line of an attack (the power forward and center) make bigger number of rebounds of a ball under boards and blocked-shots of a ball. It is possible to see the reliability of distinctions between players of different role on the realization of technical-tactical actions in tab. 2.

Analyzing the data presented in tab. 2, it is possible to note that only the point guards of men's teams had the reliable advantage over basketball players of the same role in the number of points scored in a match (p<0,05), for other players similar distinctions aren't revealed. It is also possible to note that men practically of all game roles have a higher level of the realization of 2-point and 3-point throws in a match.

Conclusions:

1. The research of the competitive activity of high-class basketball players, the definition of key components of its providing and realization are an important problem of scientific researches in the theory and practice of basketball. The analysis of the structure of the competitive activity of high quality teams allows opening features of a behavior of a team and players in a match, to plan optimum ways of its correction and the further improvement.

2. The comparative analysis of the efficiency of the realization of technical-tactical actions by the men's and women's national teams in the World Championship of 2014 showed that men's teams place much bigger emphasis in a match on attack of a basket of the rival from a distant distance. At the same time men attack from near and average distances almost twice less, than women, but thus they have a higher percent of the realization of these throws. Women's teams make bigger number of rebounds of a ball on average for a match both in defense, and in attack that is most likely caused by a large number of inexact throws and further fight for a ball jump offs.

3. The comparison of men and women taking into account the game specialization allowed revealing the existence of a single trend for them in the priority of the realization of technical-tactical actions. Men of all roles have a higher percent of the realization of 2-point and 3-point throws in a match. In turn, the basketball players acting in the defense line have an authentically higher level of rebounds of a ball in a match.
The comparative analysis of the efficiency of the realization of technical-tactical actions by basketball players of high qualification of men's and women's teams in the World Championship of 2014 taking into account a game role

<table>
<thead>
<tr>
<th>Technical-tactical actions</th>
<th>Point guards</th>
<th>Shooting guards</th>
<th>Small forwards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men (n=50) S±SD</td>
<td>Women (n=30) S±SD</td>
<td>p&lt;0,05</td>
</tr>
<tr>
<td>The gathered points</td>
<td>13,53±5,47</td>
<td>10,80±4,14</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>2-point throws, hits</td>
<td>2,99±1,61</td>
<td>2,79±1,56</td>
<td>–</td>
</tr>
<tr>
<td>2-point throws, attempts</td>
<td>6,65±2,66</td>
<td>6,90±3,15</td>
<td>–</td>
</tr>
<tr>
<td>Realization of 2-point throws</td>
<td>44,4±16,0</td>
<td>40,4±14,22</td>
<td>–</td>
</tr>
<tr>
<td>3-point throws, hits</td>
<td>2,0±1,2</td>
<td>1,28±0,83</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>3-point throws, attempts</td>
<td>5,8±2,5</td>
<td>4,35±2,08</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Realization of 3-point throws</td>
<td>32,8±14,3</td>
<td>28,4±12,8</td>
<td>–</td>
</tr>
<tr>
<td>Free throws, hits</td>
<td>2,43±1,7</td>
<td>2,21±1,33</td>
<td>–</td>
</tr>
<tr>
<td>Free throws, attempts</td>
<td>3,1±1,9</td>
<td>2,88±1,86</td>
<td>–</td>
</tr>
<tr>
<td>Realization of free throws</td>
<td>74,8±18,6</td>
<td>79,3±18,5</td>
<td>–</td>
</tr>
<tr>
<td>Resulting passes</td>
<td>5,1±2,1</td>
<td>4,86±2,26</td>
<td>–</td>
</tr>
<tr>
<td>Interceptions of a ball</td>
<td>1,56±1,2</td>
<td>1,64±1,02</td>
<td>–</td>
</tr>
<tr>
<td>Rebounds of a ball in defense</td>
<td>2,8±1,16</td>
<td>3,39±1,43</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Rebounds of a ball in attack</td>
<td>0,8±0,7</td>
<td>1,05±0,71</td>
<td>–</td>
</tr>
<tr>
<td>Total amount of rebounds of a ball</td>
<td>3,6±1,4</td>
<td>4,45±1,73</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Losses of a ball</td>
<td>3,0±1,3</td>
<td>3,46±1,20</td>
<td>–</td>
</tr>
<tr>
<td>Blocked-shots of a ball</td>
<td>0,12±0,11</td>
<td>0,14±0,26</td>
<td>–</td>
</tr>
<tr>
<td>Personal remarks (fouls)</td>
<td>4,1±1,6</td>
<td>3,36±1,41</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Effectiveness ratio (EFF)</td>
<td>6,7±4,3</td>
<td>5,66±3,0</td>
<td>–</td>
</tr>
</tbody>
</table>
### Continuation of tab. 2

<table>
<thead>
<tr>
<th>Technical-tactical actions</th>
<th>Power forwards</th>
<th>Center</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Men (n=50)</strong></td>
<td><strong>Women (n=30)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>S±SD</strong></td>
<td><strong>S±SD</strong></td>
</tr>
<tr>
<td>The gathered points</td>
<td>14.80±5.46</td>
<td>12.99±5.31</td>
</tr>
<tr>
<td>2-point throws, hits</td>
<td>4.28±2.63</td>
<td>4.59±2.17</td>
</tr>
<tr>
<td>2-point throws, attempts</td>
<td>8.68±4.73</td>
<td>11.1±3.68</td>
</tr>
<tr>
<td>Realization of 2-point throws</td>
<td>49.27±15.13</td>
<td>40.5±15.30</td>
</tr>
<tr>
<td>3-point throws, hits</td>
<td>1.44±1.09</td>
<td>1.22±1.06</td>
</tr>
<tr>
<td>3-point throws, attempts</td>
<td>4.5±2.7</td>
<td>3.95±3.79</td>
</tr>
<tr>
<td>Realization of 3-point throws</td>
<td>31.14±12.9</td>
<td>29.38±15.87</td>
</tr>
<tr>
<td>Free throws, hits</td>
<td>2.85±1.96</td>
<td>2.46±1.41</td>
</tr>
<tr>
<td>Free throws, attempts</td>
<td>12.43±8.4</td>
<td>3.61±1.75</td>
</tr>
<tr>
<td>Realization of free throws</td>
<td>69.5±19.9</td>
<td>66.48±21.99</td>
</tr>
<tr>
<td>Resulting passes</td>
<td>1.82±1.37</td>
<td>1.79±1.0</td>
</tr>
<tr>
<td>Interceptions of a ball</td>
<td>1.03±0.85</td>
<td>1.27±0.95</td>
</tr>
<tr>
<td>Rebounds of a ball in defense</td>
<td>5.5±2.53</td>
<td>5.77±1.92</td>
</tr>
<tr>
<td>Rebounds of a ball in attack</td>
<td>2.48±1.68</td>
<td>3.44±1.81</td>
</tr>
<tr>
<td>Total amount of rebounds of a ball</td>
<td>7.99±3.04</td>
<td>9.26±2.93</td>
</tr>
<tr>
<td>Losses of a ball</td>
<td>2.45±1.32</td>
<td>2.66±1.55</td>
</tr>
<tr>
<td>Blocked-shots of a ball</td>
<td>0.61±0.72</td>
<td>1.0±1.08</td>
</tr>
<tr>
<td>Personal remarks (fouls)</td>
<td>4.66±1.59</td>
<td>3.99±1.58</td>
</tr>
<tr>
<td>Effectiveness ratio (EFF)</td>
<td>7.38±4.71</td>
<td>7.65±5.08</td>
</tr>
</tbody>
</table>
Prospects of further researches are connected with the analysis of dynamics of changes in the realization of technical-tactical actions by sportsmen during the World championships in basketball.

References:

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Improving Matching Techniques Karate Style "Kyokushin"

Abstract. Purpose: to carry out the selection of systems to improve job matching technology karate-specific competitive activities. Material and Methods: analysis and compilation of scientific and methodological literature, interviews with coaches and instructors with "Kyokushin" karate teacher observations. Results: defined combination of techniques tailored specifically to competitive activity in "Kyokushin" karate. Conducted selection complexes jobs matching techniques to improve karate style "Kyokushin". Conclusion: there are five types of combinations corresponding to the specificity of competitive activity in the "Kyokushin" karate combination with a change in the sectors of defeat; with the action on the response of the enemy; with repeated blows; with the onslaught of the enemy; with the onslaught by the enemy. Selection of jobs held complexes to improve matching techniques karate style "Kyokushin" (with a partner and without a partner). Keywords: combination of techniques, complex tasks, improvement, boxing bag, boxing paws boxing pillow, "Kyokushin" karate.

Introduction. The main direction of the development of modern single combats still has the improvement of technical and tactical skill of sportsmen. 

It is established that the researches of technical-tactical skill of the last years are directed on the studying of a technique of the competitive activity [1; 3]; the development of individual models of training and competitive activity of different types of sport [8; 10]; the creation of model of technique of "stronger" sportsmen [2; 4]; the studying of biomechanical characteristics of movements [6]; the studying of the main tactical actions and receptions of sportsmen [7]; the development of technical-tactical schemes of conducting a competitive fight [5] and so on. 

It is allocated that for today the questions connected with the development of special complexes of tasks, the programs directed on the improvement of technical-tactical skill of sportsmen – wrestlers taking into account specifics of type of single combats aren't rather considered. It gives the chance to claim that for today a technique of the improvement of technical-tactical preparedness of karatekas which isn't rather developed and need the subsequent researches.

Communication of the research with scientific programs, plans and subjects. The work is performed according to the plan of RW of Kharkov state academy of physical culture.

The objective of the research: to carry out the selection of complexes of tasks for the improvement of combinational technique of karatekas taking into account specifics of the competitive activity.
The task of the research:
1. To define combinations of techniques which answer specifics of the competitive activity in "Kyokushin" karate.
2. To carry out the selection of complexes of tasks for the improvement of combinational technique of karatekas of “Kyokushin” style.

Material and methods of the research. For the solution of the put tasks such methods were used: the analysis and synthesis of these scientifically methodical references, conversations with coaches – teachers of "Kyokushin" karate.

Results of the research and their discussion. It is known that series and combinations of techniques in each type of single combats are carried out taking into account specifics of the competitive activity. So, for "Kyokushin" karate is expedient the performance of five types of combinations [9]: combinations with change of sectors of a defeat; with action on reaction of the opponent; with repeated kicks; with application of an impact of the opponent; with application of an impact on the opponent.

Complexes of tasks taking into account specifics of the performance of each combination (tab. 1-5) which are fulfilled without a partner and with a partner are developed for the improvement of combinations of techniques in "Kyokushin" karate to each type of combinations (by means of boxing paws, a pillow).

Success in combinations with change of sectors of a defeat is achieved due to the unexpected change of the quantity of kicks at a combination, their rhythm and force, carrying out the accented kicks, change of the quantity of sectors of a defeat. All these actions happen surely at change of sectors of a defeat of the opponent (tab. 1).

Table 1
Complex of tasks for the improvement of combinations with change of sectors of a defeat

<table>
<thead>
<tr>
<th>STM</th>
<th>Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boxing bag</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Without a partner</td>
</tr>
<tr>
<td></td>
<td>1. Satisfactory performance of series of kicks in one sector by the coach's signal – a fast change of a defeat sector</td>
</tr>
<tr>
<td></td>
<td>2. Satisfactory performance of series of kicks by the coach's signal – performance of separate kick in a series with emphasis on force (speed, accuracy)</td>
</tr>
<tr>
<td></td>
<td>3. Satisfactory performance of series of kicks by the coach's signal – increase in a rhythm of infliction of kicks (2 rounds on 1 min, 3 accelerations on 10 s)</td>
</tr>
<tr>
<td></td>
<td>4. Satisfactory performance of series of kicks by the coach's signal – increase in force of infliction of kicks (2 rounds on 1 min, 4 accents on 5 s)</td>
</tr>
<tr>
<td></td>
<td>5. Satisfactory performance of series from two kicks by the coach's signal – increase in quantity of kicks in a series</td>
</tr>
<tr>
<td>Boxing pillow</td>
<td>With a partner</td>
</tr>
<tr>
<td></td>
<td>1. Tasks 1-5 are the same as with a boxing bag, but at change of sectors of a defeat a circular kick in gentle level is directly struck to the rival's hip</td>
</tr>
<tr>
<td></td>
<td>2. Performance of series of kicks in the movement, at the rival's impact with a pillow – protection and counter counterattack by a series of kicks with a mine of sectors of a defeat, at retreat – attack by a series of kicks with a mine of sectors of a defeat (2–4 series)</td>
</tr>
</tbody>
</table>
|              | 3. Performance of series of kicks in the movement, attack by a series of kicks with a
mine of sectors of a defeat

| Boxing paws | 1. Performance of series of kicks in paws. The athlete with a paw causes previously the first kick in a series, and also an alternate of the following kicks and defeat sector thanks to a certain fixing and a paw turn |
| Boxing paws | 2. Performance of series of kicks in paws. By the rival's signal (opening of a defeat sector) inflictions the accented kick in the opened sector |
| Boxing paws | 3. Attack of the rival with a paw – protection and counter counterattack by a series of kicks with the following accented kick in the free sector |
| Boxing paws | 4. Attack of the rival with a paw – protection and counter counterattack by a series of kicks with the following accented kick in the free sector (1 attack of 2-3 series; 3–4 series) |

**Note.** Here and further STM – special technical means.

Characteristic of **combinations with action on reaction of the opponent** is ability to the opponent's call on reflex and conditionally reflex corresponding reactions by means of a pause, interchange, delay of a kick, provoking (wrong actual actions, threats). By means of wrong actual actions, threats, the interchange sportsmen can cancel protective actions of the opponent or, on the contrary, cause necessary protective actions (tab. 2).

**Table 2**

**Complex of tasks for the improvement of combinations with action on reaction of the opponent**

<table>
<thead>
<tr>
<th>STM</th>
<th>Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Without a partner</strong></td>
<td></td>
</tr>
<tr>
<td>1. Satisfactory performance of series of kicks in front of the mirror with imitation of wrong attack (a pause, a micropause, delay of a kick, threats): before a series; in the middle of a series; before the last kick; before a series and before the last kick</td>
<td></td>
</tr>
<tr>
<td>2. Satisfactory performance of series of kicks with the use of wrong attack (a pause, a micropause, delay of a kick, threats): before a series; in the middle of a series; before the last kick; before a series and before the last kick</td>
<td></td>
</tr>
<tr>
<td>3. Satisfactory performance of series of kicks by the coach's signal – wrong attack and the following counterattack by a series of kicks with change to a defeat sector</td>
<td></td>
</tr>
<tr>
<td>4. Satisfactory performance of series of kicks by the coach's signal – a pause (micropause) and the following counterattack by a series of kicks</td>
<td></td>
</tr>
<tr>
<td>5. Performance of tasks 1-3 with the increase in a rhythm during attack</td>
<td></td>
</tr>
<tr>
<td>6. Satisfactory performance of series of kicks by the coach's signal – the slowed-down performance of a kick with the following counterattack by a series of kicks</td>
<td></td>
</tr>
<tr>
<td>7. Performance of tasks 2, 3, 5 with the increase in series at attack (2–4 series)</td>
<td></td>
</tr>
<tr>
<td><strong>Boxing bag</strong></td>
<td>1. Task 1–6 are the same as with a boxing bag, but a circular kick in gentle level is directly struck to the rival's hip</td>
</tr>
<tr>
<td><strong>Boxing pillow</strong></td>
<td>2. Performance of series of kicks in the movement, at the rival's impact with a pillow – protection and counter counterattack by a series of kicks with imitation of wrong attack (a pause, a micropause, delay of a kick) before the last kick, at retreat – attack by a series of kicks with imitation of wrong actions (a pause, a micropause, delay of a kick): before a series; in the middle of a series; before the last kick; before a series and before the last kick (1 attack of 2-3 series; 3–4 series)</td>
</tr>
<tr>
<td><strong>Boxing pillow</strong></td>
<td>3. Performance of series of kicks in the movement, attack by a series of kicks with imitation of wrong actions (a pause, a micropause, delay of a kick, threat): in the middle of a series; before the last kick</td>
</tr>
</tbody>
</table>
1. Performance of series of kicks in paws. Provoking on protective action of the rival with paws by means of wrong the attack actions and counterattack in the opened sector

2. Performance of series of kicks in paws. By means of wrong attack cancellation of protective action of the rival with a paw and counterattack in the opened sector

3. Performance of series of kicks in paws. By means of a pause, a micropause and delay of a kick, a call of overdue reaction in protective actions of the rival with a paw and counterattack in the opened sector

4. Attack of the rival with a paw – protection and counter counterattack of 2-4 series of kicks with imitation of wrong attack (a pause, a micropause, delay of a kick) before the last kick

The success in combinations with repeated kicks is provided thanks to the unexpected change of quantity of kicks at a combination, their rhythm and force, carrying out the accented repeated kicks, change of quantity of sectors of defeat of the opponent. Interchange in kicks with repetitions in certain sectors of defeat allows to strike the unexpected accented kicks. Repeated kicks carry out for the purpose of preparation of the accented kick, a stop of attack of the opponent to keep a distant distance, for activization of actions with a definite purpose and so forth (tab. 3).

Table 3

Complex of tasks for the improvement of combinations with repeated kicks

<table>
<thead>
<tr>
<th>STM</th>
<th>Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boxing paws</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>STM</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Exercises</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Without a partner</strong></td>
</tr>
<tr>
<td></td>
<td>1. Satisfactory performance of series of kicks by the coach's signal – inflection of repeated kicks in a series with emphasis on the speed (force)</td>
</tr>
<tr>
<td></td>
<td>2. Satisfactory performance of series of kicks by the coach's signal – inflection of repeated kicks with change of a defeat sector</td>
</tr>
<tr>
<td></td>
<td>3. Satisfactory performance of series from two kicks by the coach's signal – the increase in quantity of kicks in a series with emphasis on repeated final kick</td>
</tr>
<tr>
<td></td>
<td>4. Satisfactory performance of series of kicks by the coach's signal – inflection of a series of the repeated accented kicks with the increase in a rhythm of their infliction</td>
</tr>
<tr>
<td>Boxing bag</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Tasks 1-4 are the same as with a boxing bag, but a circular kick in gentle level is directly struck to the rival's hip</td>
</tr>
<tr>
<td></td>
<td>2. Performance of series of kicks in the movement, at the rival's impact with a pillow – protection and counter counterattack by a series of kicks with the accented repeated final kick, at retreat – attack by a series of kicks with repeated kicks before a series; in a series; before the last kick; before a series and before the last kick (1 attack of 2-3 series; 3–4 series)</td>
</tr>
<tr>
<td></td>
<td>3. Performance of series of kicks in the movement, attack by a series of kicks with repeated kicks in a series; before the last kick (1 attack of 2-3 series; 3–4 series)</td>
</tr>
<tr>
<td>Boxing pillow</td>
<td>1. Satisfactory performance of series of kicks by the rival's signal (opening a defeat sector) inflection of a repeated kick in the opened sector with emphasis on the speed (force)</td>
</tr>
<tr>
<td></td>
<td>2. Satisfactory performance of series of kicks by the rival's signal (opening a defeat sector), inflection of a series of repeated kicks, in the opened sector with emphasis on the speed (force)</td>
</tr>
<tr>
<td></td>
<td>3. Attack of the rival with a paw – protection and counter attack in repeated kicks and counterattack by a series of kicks</td>
</tr>
<tr>
<td></td>
<td>4. Attack of the rival with a paw – protection and counter counterattack by a series of kicks with the repeated accented final kick</td>
</tr>
</tbody>
</table>
The positive result in combinations with application of an impact of the opponent is guaranteed at application of the counter combinations connected to maneuvering, change of the line of attack and pushing. Maneuvering, change of the line of attack and pushing, in response to an impact of the rival will allow the athlete to reject attack of the rival and to carry out counterattack action (tab. 4).

### Table 4

**Complex of tasks for the improvement of combinations with application of an impact of the opponent**

<table>
<thead>
<tr>
<th>STM</th>
<th>Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boxing bag</td>
<td><strong>Without a partner</strong>&lt;br&gt;1. Satisfactory performance of series of kicks by the coach's signal – pushing to a bag and counterattack by a series of the accented and repeated kicks with change of sectors of a defeat&lt;br&gt;2. Satisfactory performance of series of kicks by the coach's signal – maneuvering to the right (to the left) from the line of attack and counterattack by a series of the accented and repeated kicks with change of sectors of a defeat</td>
</tr>
<tr>
<td>Boxing pillow</td>
<td><strong>With a partner</strong>&lt;br&gt;1. Task 1-2 are the same as with a boxing bag, but in the movement, a circular kick in gentle level is directly struck to the rival's hip. At the rival's impact with a pillow – pushing (maneuvering from the line of attack) and counterattack by a series of the accented and repeated kicks with change of sectors of a defeat&lt;br&gt;2. Performance of series of kicks in the movement, at the rival's impact with a pillow – pushing and counterattack by a series of the accented and repeated kicks with change of sectors of a defeat</td>
</tr>
<tr>
<td>Boxing paws</td>
<td>1. Attack of the rival with a paw – pushing and counter attack by a series of the accented and repeated kicks in the open sector of a defeat&lt;br&gt;2. Attack of the rival with a paw – maneuvering from the line of attack and counter the accented and repeated kicks in the open sector of a defeat</td>
</tr>
</tbody>
</table>

When carrying out combinations with an impact on the opponent kicks with change of their quantity, rhythm and force, sectors of a defeat of the opponent, carrying out the accented repeated kicks are used. And, the change of quantity of blows, their rhythm and force, is directed on the increase which forces the opponent to pass from the attack actions to protective. Pushing during the interchange in kicks will allow to discompose the rival and to carry out action attack. The implementation of abolition causes an aspiration to be released that allows to attack it in the open sector defeat (tab. 5) in the opponent.
### Table 5

**Complex of tasks for the improvement of combinations with an impact on the opponent**

<table>
<thead>
<tr>
<th>STM</th>
<th>Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Without a partner</strong></td>
<td></td>
</tr>
<tr>
<td>Boxing bag</td>
<td>1. Satisfactory performance of series by the coach's signal – the increase in rhythm and force of infliction of kicks</td>
</tr>
<tr>
<td></td>
<td>2. Satisfactory performance of series by the coach's signal – the increase in rhythm of infliction of kicks with simultaneous change of a sector of a defeat</td>
</tr>
<tr>
<td></td>
<td>3. Satisfactory performance of series from two blows kicks by the coach's signal – the increase in quantity of kicks in a series with simultaneous increase in a rhythm of infliction of kicks</td>
</tr>
<tr>
<td></td>
<td>4. Satisfactory performance of series by the coach's signal – carrying out a series of the repeated accented kicks with increase in a rhythm of their infliction</td>
</tr>
<tr>
<td>Boxing pillow</td>
<td></td>
</tr>
<tr>
<td>With a partner</td>
<td>1. Task 1-4 are the same as with a boxing bag, but in the movement, a circular kick in gentle level is directly struck to the rival's hip. At an impact on the rival with a pillow – abolition and counterattack by a series of the accented and repeated kicks with change of sectors of a defeat</td>
</tr>
<tr>
<td></td>
<td>2. Performance of series of kicks in the movement, performance of abolition, counterattack by a series of the accented and repeated kicks, with change of sectors of a defeat</td>
</tr>
<tr>
<td>Boxing paws</td>
<td>1. Satisfactory performance of series of kicks, carrying out abolition, and counterattack by a series of the accented and repeated kicks in the open sector of a defeat</td>
</tr>
<tr>
<td></td>
<td>2. Satisfactory performance of series of kicks, carrying out pushing, and counterattack by a series of the accented and repeated kicks in the open sector of a defeat</td>
</tr>
<tr>
<td></td>
<td>3. Performance of series of kicks in the movement, carrying out abolition (pushing) and counterattack by a series of the accented and repeated kicks in the open sector of a defeat (1 attack of 2-3 series; 3–4 series)</td>
</tr>
</tbody>
</table>

**Conclusions:**

1. Five types of combinations which answer specifics of the competitive activity in "Kyokushin" karate are defined.
2. Selection of complexes of tasks for the improvement of combinational technique of karatekas of “Kyokushin” style is carried out (with a partner and without a partner).

**Prospects of the subsequent researches.** In the subsequent it is planned to develop complexes of tasks for the improvement of technical-tactical training of karatekas taking into account styles of maintaining a single combat.

**References:**


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USE OF GENERAL PHYSICAL TRAINING AND SPECIAL PHYSICAL TRAINING IN THE ANNUAL CYCLE OF TRAINING UNIVERSITY STUDENTS WHO TRAIN IN SPORTS SECTIONS SWIMMING

Abstract. Purpose: to justify ratio means general physical training and special physical training in the annual cycle of training university students who train in sports sections swimming. Material and Methods: the study involved students G. S. Skovoroda HNPU aged 16–17 years, who were involved in the sport of swimming section. In the paper we used the following methods: analysis of scientific and methodological literature, teaching observations, educational testing, pedagogical experiment; methods of mathematical statistics. Results: by volume of training loads and improved ratio means general physical training and special physical training at different stages of the annual cycle of training university students who train in sports sections swimming. Conclusions: rational relationship means general and special physical training allows you to find the most effective ways of improving the process of preparing students fins and helps to improve the absolute athletic performance.

Keywords: relationships, tools, training, education and general physical training, the annual cycle stages, students, swimming, indicators, volume loading.

Introduction. The creation of an annual training of the qualified swimmers – is a difficult process of selection and definition of an optimum ratio of means of a training action, a rational combination of different structural formations of the training process [7].

Sport training and competitive loads reached exclusively high sizes at the modern level of the development that compels coaches to search new ways of the creation of training which allow providing long finding of sportsmen in a ready state to the demonstration of high sports results [8].

Physical training – is the most important, rod section of sports training in swimming. It is aimed at the optimum development of motive abilities, at physical improvement of an organism in general and at selective improvement of those muscular groups and vegetative functions which provide the high level of special sports working capacity [1–3 but other].

A big experimental material which concerns the creation of sports training of the qualified swimmers is saved up in modern literature, its contents is defined, means and methods of the development of physical qualities are considered, volumes and intensity of training loads, ratios of means of SPT and GPT, both in the course of long-term sports activities, and in an annual cycle of preparation and so forth are established [4–6; 8; 9 but other]. The carried-out analysis gives to coaches the
effective tool for the creative work and training of perspective swimmers for the highest achievements.

At the same time the consideration of these questions through a prism of student's sport demands a close attention and a scientific justification. In practice automatic transferring of recommendations quite often meets concerning the planning of the training process of the qualified sportsmen on training of students who are engaged in sections of sports swimming, but haven’t a high level of sports qualification. In this regard questions are actual that are considered in this article.

**The objective of the research:** to prove a ratio of means of SPT and GPT in an annual cycle of training of students of higher educational institutions who train in sections of sports swimming.

**Material and methods of the research.** In the work the following methods of the research were applied: analysis of scientifically methodical literature, pedagogical supervision, pedagogical testing, pedagogical experiment, methods of mathematical statistics.

18 students of H. S. Skovoroda KNPU at the age of 16–17 years old who were engaged in section of sports swimming took part in the research and had sports qualification – II–III categories.

The pedagogical experiment was made along with two experimental and one control groups. The total amount of loading in all three groups was approximately identical, the ratio of general and special training during the different periods of an annual cycle was a miscellaneous.

Tests were held in transitional, competitive, generally-preparatory and specially-preparatory stages of the preparatory period of an annual cycle.

Sportmen were healthy and allowed by a doctor, who took part in the pedagogical research.

**Results of the research and their discussion.** Planning of volumes of loading in the I experimental group was aimed at the development of general and power endurance in the preparatory period. The usage of means and methods of training in the II experimental group put the development of special endurance for the purpose. The control group carried out loading volumes which were provided by the typical program for CYSS.

At the determination of volumes of training loads the equivalence of means of training and the intensity of their performance were considered.

The total amount of loading at sportsmen-swimmers of the I experimental group in the preparatory period (the generally-preparatory stage) made 1226 km: run is 791 km, walking is 136 km, 44 hours were spent for the exercises aimed at the development of power endurance, 92 hours – on the performance of specially-preparatory exercises, such as swimming in shovels, swimming on a rubber shock-absorber, combined swimming and so forth. The ratio of SPT and GPT made 77% and 23% on the specially-preparatory stage, the competitive and transitional periods of training. The ratio of SPT and GPT made 52%: 48%, 25%: 75% and 27%: 73% respectively.

Swimmers of the II experimental group applied generally the same means and methods of training in the preparatory period (the generally-preparatory stage). The
means of training aimed at the development of special endurance were applied with large volumes, than in the I group, at the identical number of training classes. The total amount of loading made 1251 km: running work is 640 km; walking is 144 km; the specially-preparatory exercises were carried out within 89 hours. The ratio of SPT and GPT at the stage made 67% to 33%. The competitive and transitional periods of training these indicators made 43%: 57%, 20%: 80% and 25%: 75% respectively on the specially-preparatory stage.

The total amount of loading at swimmers of the control group at the generally-preparatory stage of the preparatory period of training equaled 1198 km. Volumes of running training made 839 km, walking is 136 km, sportsmen were involved in the specially preparatory exercises within 82 hours. In general 82% are spent on GPT, and for SPT are 18%. The ratio of SPT and GPT was leveled 52%: 48%, 25%: 75% and 27%: 73% respectively on the specially-preparatory stage, the competitive and transitional periods of preparation.

Overall performance which was carried out, it checked by means of pedagogical tests which in turn characterized all parties of preparation. Results of testing of sportsmen of different groups presented in the tab after the end of the specially-preparatory stage of the preparatory period.

It should be noted that sportsmen of the II experimental group unlike the experimental and the control groups had the highest indicators with emphasis on special physical training.

The previous heat on a distance of 400 meters (tab.) was the check of the efficiency of use of a different ratio of SPT and GPT in the preparatory period. The total result of overcoming of the chosen distance in the II group equaled 1886 s that was respectively better on 13 s and 23 s, than swimmers of the I and the III groups have.

In the competitive period results in swimming at a distance of 400 meters improved in the I experimental group on 7 s, in the II experimental group on 11 s, in the control – on 4 s.

The functionality grew at all sportsmen for an annual cycle of training, but in a bigger measure at swimmers of the II experimental group because they found more time for special physical preparation.

The carried out correlation analysis between indicators of the level of the development of physical qualities and results of total competitions of a season allowed to receive the following results.

The following indicators have the greatest interrelation with results of total competitions in the transitional and generally-preparatory stage of the preparatory period at sportsmen: power endurance (exercise machine of Huettel-Martens r=0,72; 0,74), special endurance (swimming in shovels r=0,69; 0,74) and high-speed and power endurance (swimming on a rubber shock-absorber r=0,74; 0,74).

The essential influence provides on specially-preparatory training stage on results of a control heat at a distance of 400 meters: the development of special endurance (swimming in shovels r=0,66; 0,77), high-speed and power endurance (swimming on a rubber shock-absorber r=0,69; 0,76), power endurance (exercise machine of Huettel-Martens r=0,72; 0,77).
Results of testing of the level of the development of physical qualities at swimmers at different ratio of SPT and GPT (specially-preparatory stage)

<table>
<thead>
<tr>
<th>№</th>
<th>Surname, name</th>
<th>Group</th>
<th>Ratio of SPT/GPT</th>
<th>Pulling up on a cross-piece (times)</th>
<th>Bending and extension of hands in lying position (times)</th>
<th>Bending and extension of a trunk lying on a back (times)</th>
<th>Jump from a place (sm)</th>
<th>Run of 100 m (s)</th>
<th>Exercise machine “Huettel Martens”(times)</th>
<th>Swimming in shovels 100 m (s)</th>
<th>Swimming on a rubber shock-absorber (times/1 min)</th>
<th>Swimming of 400 m (combin.) (s)</th>
<th>Swimming of 400 m (combin.) (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>K-yev M.</td>
<td>I</td>
<td>52/48</td>
<td>13</td>
<td>52</td>
<td>54</td>
<td>192</td>
<td>15.4</td>
<td>56</td>
<td>80</td>
<td>53</td>
<td>312</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>M-a O.</td>
<td>I</td>
<td>52/48</td>
<td>14</td>
<td>48</td>
<td>52</td>
<td>193</td>
<td>16.1</td>
<td>53</td>
<td>83</td>
<td>55</td>
<td>317</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>S-yev V.</td>
<td>I</td>
<td>52/48</td>
<td>15</td>
<td>47</td>
<td>47</td>
<td>195</td>
<td>15.8</td>
<td>55</td>
<td>81</td>
<td>51</td>
<td>315</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>L-ko V.</td>
<td>I</td>
<td>52/48</td>
<td>14</td>
<td>55</td>
<td>49</td>
<td>188</td>
<td>16.6</td>
<td>54</td>
<td>83</td>
<td>52</td>
<td>315</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Z-ko A.</td>
<td>I</td>
<td>52/48</td>
<td>13</td>
<td>52</td>
<td>53</td>
<td>183</td>
<td>16.8</td>
<td>52</td>
<td>81</td>
<td>52</td>
<td>318</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>K-iy A.</td>
<td>I</td>
<td>52/48</td>
<td>15</td>
<td>50</td>
<td>44</td>
<td>185</td>
<td>15.6</td>
<td>52</td>
<td>85</td>
<td>54</td>
<td>322</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Kh-in S.</td>
<td>II</td>
<td>43/57</td>
<td>15</td>
<td>47</td>
<td>51</td>
<td>190</td>
<td>15.6</td>
<td>58</td>
<td>83</td>
<td>57</td>
<td>311</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>D-ko D.</td>
<td>II</td>
<td>43/57</td>
<td>14</td>
<td>52</td>
<td>47</td>
<td>185</td>
<td>16.1</td>
<td>56</td>
<td>81</td>
<td>58</td>
<td>309</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>P-ov A.</td>
<td>II</td>
<td>43/57</td>
<td>13</td>
<td>46</td>
<td>47</td>
<td>188</td>
<td>16.8</td>
<td>55</td>
<td>84</td>
<td>57</td>
<td>313</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>M-a S.</td>
<td>II</td>
<td>43/57</td>
<td>15</td>
<td>51</td>
<td>53</td>
<td>195</td>
<td>16.3</td>
<td>53</td>
<td>87</td>
<td>55</td>
<td>322</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I-ov V.</td>
<td>II</td>
<td>43/57</td>
<td>16</td>
<td>52</td>
<td>48</td>
<td>188</td>
<td>15.8</td>
<td>56</td>
<td>84</td>
<td>54</td>
<td>318</td>
<td></td>
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<tr>
<td>6</td>
<td>K-ov R.</td>
<td>II</td>
<td>43/57</td>
<td>13</td>
<td>57</td>
<td>48</td>
<td>183</td>
<td>15.9</td>
<td>57</td>
<td>85</td>
<td>55</td>
<td>313</td>
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<tr>
<td>1</td>
<td>A-yan V.</td>
<td>III</td>
<td>61/39</td>
<td>15</td>
<td>50</td>
<td>53</td>
<td>194</td>
<td>15.6</td>
<td>56</td>
<td>81</td>
<td>51</td>
<td>314</td>
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<tr>
<td>2</td>
<td>V-vk P.</td>
<td>III</td>
<td>61/39</td>
<td>14</td>
<td>54</td>
<td>46</td>
<td>195</td>
<td>16.1</td>
<td>53</td>
<td>80</td>
<td>50</td>
<td>315</td>
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<td>3</td>
<td>V-ov D.</td>
<td>III</td>
<td>61/39</td>
<td>13</td>
<td>53</td>
<td>45</td>
<td>183</td>
<td>16.2</td>
<td>51</td>
<td>83</td>
<td>51</td>
<td>314</td>
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<tr>
<td>4</td>
<td>Ye-ov Yu.</td>
<td>III</td>
<td>61/39</td>
<td>14</td>
<td>44</td>
<td>46</td>
<td>182</td>
<td>15.4</td>
<td>51</td>
<td>85</td>
<td>53</td>
<td>324</td>
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<tr>
<td>5</td>
<td>K-ko A.</td>
<td>III</td>
<td>61/39</td>
<td>13</td>
<td>49</td>
<td>56</td>
<td>175</td>
<td>16.1</td>
<td>54</td>
<td>79</td>
<td>50</td>
<td>318</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>K-uk A.</td>
<td>III</td>
<td>61/39</td>
<td>16</td>
<td>52</td>
<td>53</td>
<td>171</td>
<td>16.1</td>
<td>52</td>
<td>84</td>
<td>53</td>
<td>324</td>
<td></td>
</tr>
</tbody>
</table>
Training is stored the same tendency of influence of the development of physical qualities and functional systems on results of a control heat at a distance of 400 meters in the competitive period by free style.

As a result the found positive interrelation between results of a control heat on 400 meters by free style with such indicators, as: exercise machine of Huettel-Martens; swimming on a rubber shock-absorber; swimming in shovels and the combined swimming of 400 meters. And the improvement of sports results is connected with the growth of functional indicators of the sportsman. Than the sports result is higher, the stronger communication with data of functional preparation.

Thus, despite of the total amounts of the executed loading, and also volumes of high-speed work in cyclic means in all groups were approximately identical, a divergence in the ratio SPT and GPT led to notable shifts of a large number of indicators, including also sports results.

**Conclusions.** The rational ratio of means of the general and special physical training allows finding ways of the most effective improvement of the process of training of students-swimmers.

The ratio of means of the general and special physical preparation in an annual cycle of training which makes is the most effective for improvement of absolute sports results of students who are engaged in sections of sports swimming: in the transition period – 25% and 75%; in generally-preparatory stage of the preparatory period – 67% and 33%; on the specially-preparatory stage – 43% and 57%, in the competitive period – 20% and 80%.

Authentically high communication of physical working capacity with results of total competitions of a season is found. So, in the transition period and generally-preparatory stage of preparation indicators of special and high-speed and power endurance have the greatest interrelation with results of total competitions. The essential influence provides the development of special, high-speed and power and power endurance on the specially-preparatory stage of preparation and in the competitive period of training.

Optimum volumes of training loads at stages of annual training in hours are certain: in the transition period – 152 hours; in generally-preparatory and specially-preparatory stages of the preparatory period – 161 hours and 108 hours respectively, in the competitive period – 129 hours. In total in a year – are 550 hours. The use of noted volumes promotes the increase of sports results of students-swimmers.

**The prospect of the subsequent researches** in this direction consists in the development of programs of trainings depending on the level of functional development of students who are engaged in sections of sports swimming.

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EFFECT OF THE TECHNIQUES OF KARATE ON FUNCTIONAL STATUS AND PHYSICAL FITNESS OF STUDENTS OF FLIGHT ACADEMY

Abstract. Purpose: to investigate the effect of the application of the techniques of karate on functional status and physical fitness of students of Flight Academy first year. Material and Methods: the study involved students of Flight Academy EG (pilots, n=25) and CG (rescuers, n=23). We determined the effect of the techniques of karate in physical fitness, running the 100 meters, bending and unbending hands ups, pull-ups on the bar, running 3,000 meters, 10 revolutions per gymnastic wheel; on functional status, body length, body weight, heart rate at rest, vital capacity, vital index (ml·kg⁻¹) sample and test Stange and Ghencea. Results: revealed that the use of uniform and alternating load of running helped improve the outcome for 3000 m run and function of the respiratory system. Anaerobic subject to the techniques of karate contributed to increasing resistance to hypoxia. Conclusions: this study suggests the need to improve physical fitness of students by implementing motor activity of certain sports.

Keywords: physical training, functional status, vital capacity, vital index.

Introduction. Vocational training of cadets of flight educational institutions is the main factor of the quality of control of aircraft, ensuring the reliability of flight business. Physical preparation is an important factor in the improvement of the level of health and special efficiency of representatives of flight personnel. However physical exercises will promote the greatest effect at a combination of the general physical and applied physical preparation.

At the same time the analysis of a condition of the organization of physical preparation at a stage of the professional formation [7] revealed a variety of reasons which reduce its efficiency: the low level of physical development and physical fitness of graduates of high schools, the inefficiency of the real system of physical training of cadets, its uniformity and not versatility [1; 2; 4].

It is established that the optimum motive mode providing the introduction of a complex of various forms of physical training is a necessary condition of special physical fitness of cadets [7; 5].

It is proved that an orientation of cadets to systematic classes on physical exercises forms the need to resolve the system of physical preparation by elements of different types of sport. As a result of the carried-out questioning it is established that the most popular sport among cadets of the flight academy is karate which elements are suggested to be entered into the system of physical preparation.
Data about the inclusion in the system of physical training of cadets of flight educational institutions of elements of sports exercises aren’t revealed in available special scientific and methodical literature that was a subject of our researches.

**Communication of the research with scientific programs, plans, subjects.**
The research is executed according to a subject of the Consolidating plan of the research work in the sphere of physical culture and sport for 2011-2015 of the Ministry of family, youth and sport of Ukraine within the subject "Theoretic-methodological bases of creation of the system of mass control and assessment of the level of the development and physical fitness of various groups of the population" (the number of the state registration is 0111U000192).

The objective of the research – is to develop a technique of the formation of elements of technology of karate and to define its influence on a functional condition of cadets of the flight academy.

**Materials and methods of the research.** Cadets of the flight academy of the first course took part in the researches: pilots (EG, n=25) and lifeguards (CG, n=23). The control group was engaged according to the approved program, and for pilots of EG elements of technique and certain exercises of special physical training of karatekas took root into this program.

In the research such methods of research were applied: the analysis and the generalization of special scientific and methodical literature, pedagogical testing (run on 100 m, pulling up on a crossbeam, bending and extension of hands in an emphasis, run on 3000 m and 10 turns in a gym roller), methods of definition of a functional state (VCL, HR, minute volume of breath, tests of Gench and Stange), methods of mathematical statistics.

**Results of the research and their discussion.** Materials of the research of many authors testify that functional activity of systems of an organism considerably increases at the rational development of physical qualities [9-11].

Materials of physical fitness of cadets of the flight academy of the first year of training are presented in the tab. 1.

It is already proved that the formation of movement skills and the development of special physical qualities are based on the increase of the general physical working capacity [3; 5; 6; 8].

Run on endurance, as a working capacity of the increase basis is applied for this purpose in many sports.

Running loadings of continuous character from 30 to 40 minutes at intensity of HR 155-160 bpm were applied in the experimental group. Besides, variable run was used on pieces of 200-300 m. The number of repetitions and intervals of rest defined individually. Only continuous running loadings were applied in the control group. The total amount of running loadings was identical in both groups.

The conducted researches showed that the combination of continuous running loadings to variables promoted the reliable improvement of result of run on 3000 m. The tendency of the improvement of result of run on 3000 m is observed in the control group, however these changes aren't reliable.

Introduction of elements of technology of karate in classes promoted the increase of the level of high-speed and power qualities. Specifics of the performance
of elements of karate consist in the performance of movements with the maximum speed. It promotes the increase in speed of reaction and frequency of movements in unit of time. The improvement of result of run on 100 m was the result of the performance of elements of karate.

The performance of the standard exercises in the control group promoted only a tendency of the improvement of the result of run on 100 m.

Results of power endurance are provided at cadets-pilots as indicators of power preparedness: pulling up on a crossbeam and bending and extension of hands in an emphasis.

Results of the research testify that the reliable improvement of power manifestations is observed in both groups. However in the experimental group indicators improved on 18,75 and 55,5%, and in the control – on 12,92 and 41,1%.

It is proved that the level of vestibular stability is a basis in the improvement of technology of management of aircraft. The test offered by the State program – 10 turns in a gym roller –objectively reflects the level of vestibular stability for the smallest time.

The performance of various jumps with rotation in elements of technology of karate promoted the reliable improvement of test for vestibular stability. The improvement of the result made 23,53% in the experimental group. The tendency of increase of the level of result of vestibular stability made 10,77% that isn't the reliable improvement (р>0,05).

The morphofunctional state changed more mainly in the experimental group (tab. 2).

The researches testify that body length has no reliable changes in both groups. However body weight has the reliable decrease (5,34%). The tendency of the decrease of body weight is observed and in the control group (1,4%) at р<0,05.

The reduction of body weight amplifies at the expense of running loading in the experimental group which had both an aerobic, and an anaerobic orientation.

One of the informative indicators is HR the level of a state of which defines a condition of physical working capacity. Delay of HR at rest testifies to economization of a blood circulation function.

The indicator of function of breath is VCL. Its significant increase is observed in the experimental group that provides a necessary ventilation of lungs at physical activities. The increase in VCL occurs at the expense of running loadings of uniform and variable character in the experimental group and also because the elements of technology of karate are carried out at the constant deficiency of pulmonary ventilation that finally causes the activation of functional reserves.

The results of the research testify that the vital index (VCL relation to a body weight) rises with the increase in VCL and the decrease in a body weight. The increase of such ratio proves about the rationalization of introduction of a technique of the application of elements of karate in the process of physical preparation as the physical working capacity increases. The reliable changes of indicators of a vital index aren’t observed in the control group.
### Table 1

**Indicators of physical fitness of cadets of the first year of training**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Experimental group (n=23)</th>
<th>Control group (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run of 100 m (s)</td>
<td>X: 14,20, m: 0,07, X: 13,60, m: 0,12</td>
<td>t: 4,61, p: &lt;0,01</td>
</tr>
<tr>
<td>Bending and extension of hands in an emphasis (quantity)</td>
<td>X: 32,00, m: 0,53, X: 38,00, m: 0,45</td>
<td>t: 3,53, p: &lt;0,01</td>
</tr>
<tr>
<td>Pulling up on a crossbeam (quantity)</td>
<td>X: 9,00, m: 0,12, X: 14,00, m: 0,41</td>
<td>t: 4,08, p: &lt;0,01</td>
</tr>
<tr>
<td>Run of 3000 m (min)</td>
<td>X: 14,40, m: 0,17, X: 13,50, m: 0,45</td>
<td>t: 2,73, p: &lt;0,05</td>
</tr>
<tr>
<td>10 turns in a gym roller</td>
<td>X: 17,00, m: 0,18, X: 13,00, m: 0,24</td>
<td>t: 4,26, p: &lt;0,01</td>
</tr>
</tbody>
</table>

### Table 2

**Indicators of a functional condition of cadets of the first year of training**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Experimental group (n=23)</th>
<th>Control group (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body length (sm)</td>
<td>X: 171,20, m: 1,72, X: 173,80, m: 0,96</td>
<td>t: 1,09, p: &gt;0,05</td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>X: 75,72, m: 0,83, X: 71,7, m: 0,78</td>
<td>t: 3,55, p: &lt;0,05</td>
</tr>
<tr>
<td>Rest HR(quantity)</td>
<td>X: 69,72, m: 0,73, X: 62,8, m: 0,87</td>
<td>t: 2,44, p: &lt;0,05</td>
</tr>
<tr>
<td>VCL (l)</td>
<td>X: 3,76, m: 0,09, X: 4,87, m: 0,17</td>
<td>t: 7,44, p: &lt;0,001</td>
</tr>
<tr>
<td>Vital index (ml · kg⁻¹)</td>
<td>X: 52,29, m: 0,72, X: 59,55, m: 0,36</td>
<td>t: 3,39, p: &lt;0,01</td>
</tr>
<tr>
<td>Test of Stange (s)</td>
<td>X: 49,70, m: 0,18, X: 53,75, m: 0,27</td>
<td>t: 6,36, p: &lt;0,01</td>
</tr>
<tr>
<td>Test of Gench (s)</td>
<td>X: 27,15, m: 0,12, X: 32,27, m: 0,27</td>
<td>t: 5,32, p: &lt;0,01</td>
</tr>
</tbody>
</table>
The application of elements of karate in physical training of cadets of the flight academy assisted to the increase of the resistance to a hypoxia. So, the indicators of the test of Stange increased in the experimental group on 14,28% (<0,01), and the test of Gench on 19,50% (р<0,001). The indicators of the test of Stange increased on 10,60% (р<0,05), and the indicators of the test of Gench didn't reach the reliable changes (р>0,05) in the control group.

Thus, the introduction in the process of physical preparation of elements of technology of karate promoted the substantial increase of physical fitness and the functional level of systems of an organism.

Conclusions:
1. The introduction of elements of technology of karate in studies on physical training of cadets of the flight academy promoted the increase of a level of the development of physical qualities that was a basis of the increase of functionality.
2. The combination of continuous methods of the development of endurance in combination with variable loadings provided the mobilization of reserve opportunities of an organism of examinees and the increase of the level of recovery processes.

The development of programs of health developing technologies by elements of single combats taking into account the specific psychophysiological features of the engaged can be the prospect of further researches.

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INFLUENCE OF THE PROGRAM OF PHYSICAL TRAINING OF HIGHLY SKILLED HOCKEY PLAYERS (FORWARDS) ON INDICATORS OF THE COMPETITIVE ACTIVITY

Abstract. Purpose: to define the efficiency of the program of physical training of highly skilled sportswomen on indicators of the competitive activity in field hockey that was offered in the first pre-season of an annual macrocycle. Material and methods: influence of the offered program was decided with the help of testing of motive qualities and technical elements of female hockey players. Results: correlation between indicators of the competitive activity of players of attack and the level of physical preparation was found out. Conclusions: positive influence of introduction of the program on physical preparation for highly skilled female hockey players, namely – forwards, on indicators of their competitive activity is revealed.

Keywords: field hockey, physical preparation, indicators of the competitive activity, physical qualities, preparation stage.

Introduction. Modern field hockey – is a sport which demands a high level of the development of physical qualities and on this basis of the corresponding technical and tactical preparedness.

The effective system of preparation can provide successful performances in competitions of a high rank which consists of three main subsystems of trainings: competitions and factors which increase the efficiency of competitive and training activity.

The improvement of the educational – training process for the purpose of the achievement of it’s the most effective functioning (within optimum) perhaps thanks to the comprehensive accounting of regularities of sports preparation, its external and internal conditions and factors, application of modern means and methods, studying of features of certain players and team, in general [8].

One of factors which promote the increase of efficiency of the training process is the control of physical fitness of sportsmen as physical preparation plays the main role in formation of motive abilities of hockey players on a grass [5].

Physical preparation takes the leading place in the system of training of sportsmen of high qualification therefore the related questions always remain actual, it was and it is a basis of numerous researches, fundamental works of V. Platonov, M. Bulatova [7], A. Godika [1], O. Fedotova [8], etc. are devoted to it.

The purpose of physical preparation in an annual cycle of training of the qualified hockey players is the achievement of the highest level of the development of motive potential taking into account requirements of the competitive activity. The
modern analysis of the competitive activity in field hockey allows to draw a conclusion on the significant growth in indicators of the activity of a game, the density of technical and tactical actions of players (number of actions in unit of time) which are the evidence of the increase of a functionality and a level of physical fitness of hockey players respectively [5; 8].

The development of a technique of influence on the leading systems of power supply by the optimization of the main components of dispensing of physical activities (intensity, number of repetitions, duration of intervals of work and rest, nature of rest, level of coordination complexity, and so forth), and also rational distribution of loadings of a different orientation, throughout an annual cycle of preparation is one of the directions of the improvement of physical training of highly skilled hockey players [2; 6].

In the modern theory and practice of the field hockey the problem of physical preparation remains insufficiently developed that is confirmed by the absence of evidence-based recommendations concerning a construction and a control of the process of physical preparation, a dynamics of the development of physical qualities, at different stages of an annual training cycle and the corresponding application of special means and methods.

**Communication of the research with scientific programs, plans, subjects.**
The research is executed on the basis of the Built plan of the research work in the sphere of physical culture and sport for 2006-2010 behind a subject 2.1.11p "Optimization of the educational-training process of sportsmen in game sports in an annual cycle of preparation" (number of the state registration is 0107U004731).

**The aim of the research:** to define the efficiency of influence of the offered program of physical training of highly skilled sportswomen in field hockey (forwards) on indicators of the competitive activity.

**The tasks of the research:**
- to analyse a condition of a problem of physical preparation in team game sports;
- to define a structure and contents of the program of physical preparation in the first preparatory period;
- to confirm the efficiency of influence of the program from physical preparation on indicators of the competitive activity of highly skilled hockey players (forwards) experimentally.

**Material and methods of the research.** Such methods of the research were used for the solution of the put tasks:
- analysis of scientifically methodical and special literature, normative documents;
- pedagogical methods of the research (pedagogical supervision, pedagogical testing, pedagogical experiment);
- medicobiological methods (pulsometry, veloergometry);
- methods of mathematical statistics.

**Results of the research and their discussion.** As a result of the experiment parameters of planning of physical preparation the skilled hockey players were offered and certain changes in the structure of preparedness which occurred
throughout an annual training cycle. The correlation analysis between indicators of physical fitness and indicators of the competitive activity allows to certify the existence between them a large number of statistical interrelations that gives the chance to provide that the increase and the maintenance will improve game indicators at the certain level of physical abilities.

It is necessary to be engaged in the development and the improvement of physical qualities during all annual cycle of preparation, but the greatest attention is paid to it in the course of the preparatory period therefore not casual at creation of the program of the annual training cycle "the development and the improvement of physical qualities" tasks in the preparatory period is priority [4].

Thus, the development of training programs on physical training for players of different roles became the purpose of our research which would consider certain peculiar features in the structure of preparedness of highly skilled hockey players and their efficiency [3]. Therefore a change in the structure of physical preparation was the first step for the development of such programs according to game roles in the first preparatory period of an annual microcycle (tab. 1).

The task of general – preparatory stage of the first preparatory period is the creation of the base of physical fitness of players first of all. Therefore, having analyzed the obtained data, we introduced amendments in planning of loadings of different orientation separately for each of groups of players: defenders, midfielders and forwards.

Modern field hockey advances rather strict requirements to forwards concerning the level of their technical and tactical skill, physical and functional fitness.

The analysis of correlation communications (tab. 2) between indicators of forwards in field hockey gives the chance to note that the greatest number of interrelations with competitive technical and tactical actions have high-speed and power qualities which beat off the nature of overwhelming movements of players of this role: accelerations, passes, kicks, and so forth. High statistical sheaves with these qualities have almost all TTA which were defined by us in the course of the competitive activity (r=0,71–0,90), the exception is made by the quality of performance of outplaying (r =-0,68) and the effectiveness ratio (r =-0,58) with which there are average connections and efficiency of the performance of maintaining (r =-0,30) which answers a weak interrelation with high-speed and power qualities.

High-speed qualities have high statistical connections with number of picking out (r=0,73), average interrelations with quality of performance of dribbling (r=0,53), picking out (r=0,69), quantity of shots for a goal (r=0,64), the coefficient of intensity (r =-0,57). It isn't revealed statistical communications between high-speed indicators and quality of the performance of stops. Results of forwards in shuttle run have strong statistical communication with number of passes (r=0,81), dribbling (r=0,83), grasp changes (r=0,73), quality of performance of shots at a goal (r=0,81) and the coefficient of intensity (r=0,83). Average statistical communication exists with the effectiveness ratio (r=0,59). The aren’t connection with quality indicators of the performance of stops and picking out.
### Table 1

The training program from physical preparation for hockey players of high qualification in the first preparatory period of an annual training cycle

<table>
<thead>
<tr>
<th>Content of exercises</th>
<th>Orientation</th>
<th>Intensity</th>
<th>Dosing</th>
<th>Method of training</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pedagogical</td>
<td>physiologic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Basic development mesocycle</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-country race</td>
<td>General endurance</td>
<td>Aerobic</td>
<td>Average</td>
<td>3000 m</td>
<td>Repeated</td>
</tr>
<tr>
<td>Cross-country race</td>
<td>General endurance</td>
<td>Aerobic</td>
<td>Low – average</td>
<td>6000 m</td>
<td>Repeated</td>
</tr>
<tr>
<td>Fartlek</td>
<td>High-speed endurance</td>
<td>Anaerobic glycolytic</td>
<td>High – low</td>
<td>200–400–200–400</td>
<td>Interval</td>
</tr>
<tr>
<td>Pace running</td>
<td>High-speed endurance</td>
<td>Anaerobic glycolytic</td>
<td>High</td>
<td>1000 m</td>
<td>Interval</td>
</tr>
<tr>
<td>Run of 50 m in 50 m of walking</td>
<td>High-speed endurance</td>
<td>Anaerobic glycolytic</td>
<td>High</td>
<td>10 times</td>
<td>Interval</td>
</tr>
<tr>
<td>Stretching</td>
<td>Flexibility</td>
<td>Aerobic</td>
<td>Low</td>
<td>8–10 min</td>
<td>Repeated</td>
</tr>
<tr>
<td>Acceleration on 15 m from a movement</td>
<td>Speed</td>
<td>Anaerobic</td>
<td>High</td>
<td>5 times</td>
<td>Repeated</td>
</tr>
<tr>
<td>Acceleration on 20 m from a place</td>
<td>Speed</td>
<td>Anaerobic</td>
<td>High</td>
<td>5 times</td>
<td>Repeated</td>
</tr>
<tr>
<td>Acceleration on 10 m from a place and from a movement</td>
<td>Speed</td>
<td>Anaerobic</td>
<td>High</td>
<td>5 times</td>
<td>Repeated</td>
</tr>
<tr>
<td>Acceleration on 30 m from a place and from a movement</td>
<td>Speed</td>
<td>Anaerobic</td>
<td>High</td>
<td>5 times</td>
<td>Repeated</td>
</tr>
<tr>
<td>Jumps through out a gymnastic bench</td>
<td>High-speed and power</td>
<td>Mixed</td>
<td>Average</td>
<td>5–8 sets</td>
<td>Interval and serial</td>
</tr>
<tr>
<td>Jumps through out 10 barriers, acceleration of 10 m</td>
<td>High-speed and power</td>
<td>Mixed</td>
<td>High</td>
<td>5 sets</td>
<td>Interval and serial</td>
</tr>
<tr>
<td>Run of 30 m (rotation of a usual run)</td>
<td>Dexterity</td>
<td>Mixed</td>
<td>Average</td>
<td>Repeat 6 times</td>
<td>Repeated</td>
</tr>
</tbody>
</table>
and a back forward in each 5 m)

<table>
<thead>
<tr>
<th>Exercise Description</th>
<th>Type</th>
<th>Anaerobic</th>
<th>High</th>
<th>Average – high – low and so forth</th>
<th>1–2 circles</th>
<th>Repeated</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run of 200 m – run up a ladder. Descent – run by a ladder up, descent – run of 200 m</td>
<td>Endurance</td>
<td>Aerobic and anaerobic</td>
<td></td>
<td></td>
<td></td>
<td>Repeated</td>
<td>M/f</td>
</tr>
<tr>
<td>Acceleration from different starting position.</td>
<td>Speed</td>
<td>Anaerobic</td>
<td>High</td>
<td></td>
<td>10 times</td>
<td>Repeated</td>
<td>M/f</td>
</tr>
<tr>
<td>Performance of passes in a square with a movement in the course of a pass. Each player has to run 2 times in perimeter of a square. To run 3 times after rest.</td>
<td>Special speed</td>
<td>Anaerobic</td>
<td>High</td>
<td></td>
<td></td>
<td>Repeated</td>
<td>D, M/f</td>
</tr>
<tr>
<td>Run with the maximum frequency on a place (10 s), a overthrow forward, breakthrough on 20 m</td>
<td>Dexterity, speed</td>
<td>Mixed</td>
<td>High</td>
<td></td>
<td>5 times</td>
<td>Interval</td>
<td>M/f, F</td>
</tr>
<tr>
<td>Three overthrows forward, jumps through out five barriers 0,7 m high (distance between barriers – 1 m), a overthrow forward, breakthrough on 15 m</td>
<td>Dexterity, high-speed and power</td>
<td>Mixed</td>
<td>Average – high</td>
<td></td>
<td>5 times</td>
<td>Interval</td>
<td>M/f</td>
</tr>
<tr>
<td>6 players of attack and 4 players of protection take place about the central line of a field. Players of group of attack move with a ball to the gate at the maximum speed of run. A task of players of protection – to catch a ball</td>
<td>Special speed</td>
<td>Anaerobic</td>
<td>High</td>
<td></td>
<td>6 times</td>
<td>Repeated</td>
<td>D, F</td>
</tr>
</tbody>
</table>

**Basic stabilizing mesocycle**

<table>
<thead>
<tr>
<th>Exercise Description</th>
<th>Type</th>
<th>Anaerobic</th>
<th>Low</th>
<th>8 min</th>
<th>Repeated</th>
<th>Interval and repeated</th>
<th>D, M/f, F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stretching</td>
<td>Flexibility</td>
<td>Aerobic glycolytic</td>
<td>High</td>
<td>4 min</td>
<td>Interval and repeated</td>
<td>D, M/f</td>
<td></td>
</tr>
<tr>
<td>Run around (the last one does acceleration and becomes directing)</td>
<td>Special</td>
<td>Anaerobic glycolytic</td>
<td>High – average</td>
<td></td>
<td>Interval and repeated</td>
<td>D, M/f</td>
<td></td>
</tr>
<tr>
<td>Uniform, variable run</td>
<td>Endurance</td>
<td>Aerobic</td>
<td>Low – average</td>
<td>1200–2000 m</td>
<td>Repeated, interval</td>
<td>D, M/f, F</td>
<td></td>
</tr>
<tr>
<td>Exercise Description</td>
<td>Exercise Type</td>
<td>Training Type</td>
<td>Intensity</td>
<td>Sets/Intervals</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run up ladder. Descent</td>
<td>General endurance</td>
<td>Mixed</td>
<td>High – low</td>
<td>36 steps</td>
<td>Interval and repeated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 jumps on a place</td>
<td>High-speed and power</td>
<td>Mixed</td>
<td>Average</td>
<td>4 sets with SE 30 s</td>
<td>Repeated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jumps from a full crouch stand</td>
<td>High-speed and power</td>
<td>Mixed</td>
<td>Average</td>
<td>3 sets of 10 jumps</td>
<td>Repeated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run in connection with jumps in a gym of 20x30 m: the 1st circle – usual; the 2nd – with jumps throughout benches and jumps up to basketball backboards; the 3rd – usual; the 4th – with jumps and so forth</td>
<td>High-speed and power</td>
<td>Mixed</td>
<td>Average</td>
<td>7 km</td>
<td>Interval and repeated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run on 15 m from a movement</td>
<td>High-speed and power</td>
<td>Anaerobic</td>
<td>High</td>
<td>5–10 times</td>
<td>Repeated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run on 50 m from a place</td>
<td>Speed</td>
<td>Anaerobic</td>
<td>High</td>
<td>5 times</td>
<td>Repeated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jumps on a place (knees to a chest) behind an acceleration of signal on 10 m</td>
<td>Speed</td>
<td>Anaerobic</td>
<td>High</td>
<td>5 times</td>
<td>Repeated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.P. – forwards stand a back forward on the line of start, defenders – for 5 m from them (facing the line of start). Behind a trainer's signal forwards run 5 m a back forward and having developed on 180° carry out acceleration of 20 m. Tasks of defenders to catch up and touch forwards. M/f play in couples</td>
<td>Speed</td>
<td>Mixed</td>
<td>High</td>
<td>Repeat 5 times</td>
<td>Competitive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay with change of the direction of the movement. Players are distributed on two teams. Behind a signal the first in each team begin to run &quot;slalom&quot; between racks and reach to the finish, come back to the line of start</td>
<td>Dexterity</td>
<td>Mixed</td>
<td>High</td>
<td>Repeat 3–5 times</td>
<td>Competitive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise is carried out in a square of</td>
<td>Special speed</td>
<td>Anaerobic</td>
<td>High</td>
<td>7–12 min</td>
<td>Repeated</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
20-30 m. "Eight": the player No. 1 does a fast pass to the player No. 2 and accelerates on his place. The player No. 2, having got a ball, passes to the player No. 3 and also he accelerates on his place and so forth

<table>
<thead>
<tr>
<th>Passes of stuffed balls by hands and feet in couples from different starting positions.</th>
<th>High-speed and power</th>
<th>Aerobic</th>
<th>Average</th>
<th>4–7 sets of 10 changes over</th>
<th>Repeated</th>
<th>M/f</th>
</tr>
</thead>
</table>

The player No. 2 passes to the player No. 8 who in one touch passes to the player No. 5. Then the player No. 5 carries out an octopus with a ball on 25–30 m and passes under a throw to the player No. 8. The same is carried out on the opposite flank

<table>
<thead>
<tr>
<th>Speed, high-speed and power</th>
<th>Mixed</th>
<th>High</th>
<th>M/f, F</th>
</tr>
</thead>
</table>

High-speed dribbling by the forward from a midfield to a blow circle. The defender has to choose a moment and at a full speed moves in advance to the player who owns a ball

<table>
<thead>
<tr>
<th>Special speed</th>
<th>Anaerobic</th>
<th>High</th>
<th>10–15 min</th>
<th>Repeated</th>
<th>D, F</th>
</tr>
</thead>
</table>

Relay with a change of the direction of the movement with a stuffed ball in hands. Behind a signal the first in each team begin to run slalom between racks to the line of the finish, then come back to a start place

| Dexterity | Mixed | High | Repeat 5 times | Competitive | D, F |
Table 2

Correlation matrix of interrelation of indicators of functional preparedness of hockey players on a grass – forwards (n=5) and their TTA in games of the Ukrainian championship (n=15)

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Run on 30 m</th>
<th>Long jump</th>
<th>Shuttle run of 180 m</th>
<th>Run of 2000 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stops</td>
<td>-0.24 (0.04)</td>
<td>-0.85 (-0.74)</td>
<td>0.46 (0.02)</td>
<td>0.65 (0.56)</td>
</tr>
<tr>
<td>Passes</td>
<td>-0.32 (-0.39)</td>
<td>-0.78 (-0.72)</td>
<td>0.81 (0.28)</td>
<td>0.65 (0.42)</td>
</tr>
<tr>
<td>Dribbling</td>
<td>-0.15 (-0.53)</td>
<td>-0.81 (-0.30)</td>
<td>0.83 (-0.31)</td>
<td>0.78 (-0.24)</td>
</tr>
<tr>
<td>Outplaying</td>
<td>-0.25 (-0.36)</td>
<td>-0.85 (-0.68)</td>
<td>0.48 (0.08)</td>
<td>0.65 (0.33)</td>
</tr>
<tr>
<td>Picking out</td>
<td>0.73 (-0.69)</td>
<td>0.77 (-0.71)</td>
<td>0.40 (0.25)</td>
<td>0.21 (0.15)</td>
</tr>
<tr>
<td>Grasp change</td>
<td>0.41 (-0.46)</td>
<td>-0.95 (-0.73)</td>
<td>0.73 (0.11)</td>
<td>0.66 (0.26)</td>
</tr>
<tr>
<td>Shots at a goal</td>
<td>0.64 (-0.43)</td>
<td>-0.78 (-0.90)</td>
<td>0.31 (0.81)</td>
<td>0.25 (0.64)</td>
</tr>
<tr>
<td>ER</td>
<td>-0.40</td>
<td>-0.58</td>
<td>0.59</td>
<td>0.43</td>
</tr>
<tr>
<td>CI</td>
<td>-0.57</td>
<td>-0.86</td>
<td>0.83</td>
<td>0.51</td>
</tr>
</tbody>
</table>

Note. In the table the specified correlation level with quantitative indices, in handles with their high-quality performance.

The general endurance which was defined in run on 2000 m, has strong statistical communication only with the frequency of application by forwards of dribbling in the course of a game (r=0.78). There are average statistical connections with the majority of indicators of the competitive activity, namely: with quantity (r=0.65) and quality (r=0.56) of the performance of stops, number of passes (r=0.65), outplaying (r=0.65), grasp changes (r=0.66), quality of the performance of shots at a goal (r=0.64) and the coefficient of intensity (r=0.51).

There are weak or very weak statistical connections between all other indicators of forwards.

Conclusions. The analysis of a condition of a problem of physical training of sportsmen of high qualification, including in team game sports, testified that physical preparation is one of the important links in the general structure of the training process and significantly influences the parties of preparation and the competitive activity first of all.

Results of the conducted researches showed that introduction of effective individually group program of physical preparation positively influences the productivity and the efficiency of the competitive activity of forwards, creates all prerequisites for the realization of functional and physical potential of an organism of sportswomen. The optimum structure of preparedness of hockey players becomes a base for the stability of manifestation of high rates of the competitive activity.

It is certain that there are statistical interrelations between indicators of physical fitness of highly skilled sportswomen in field hockey and indicators of the
competitive activity. It is found out that the quantity and the degree of such interrelations at players can be miscellaneous. The received information can be used for the purpose of the correction of planning of means of training.

We see prospects of the subsequent researches in this direction in the development and the introduced training programs on physical training for female hockey players on a grass of high qualification for the purpose of the optimization of the level of their physical fitness and the development of motive qualities which play an important role for the performance of game functions by them during the competitive activity.

References:
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GRYNKO V.
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STUDENT’S ATTITUDE TO PHYSICAL EDUCATION AND HEALTHY WAY OF LIFE AND THEIR SELF-ASSESSMENT OF PHYSICAL FITNESS

Abstract. Aim: To study the student’s attitude of physical education and healthy lifestyles and their own assessment of physical fitness and physical qualities of priority. Material and methods: The questionnaire of students from Kharkov National Economic University and Kharkov National Technical University of Agriculture by Petro Vasilenko. The study involved 166 first-year students from which there are 77 boys and 89 girls. Results: The study revealed that 69.35% respondents supported a healthy lifestyle and keeping it; 84.8% respondents supported to physical education classes and realize the benefits; 40.65% respondents are satisfied with their own level of physical fitness. Conclusions: This study did not provide enough information that in this current time there is a significant decline in the level of interest and motivation of students towards healthy living and physical fitness.

Keywords: interest, motivation, positive attitude, educational process, physical qualities.

Introduction: The individual development of students depends on their health, levels of motivation, the attitude towards physical education and a healthy lifestyle. The main problem of the modern system of higher education is to search for the best ways to prepare competitive professionals, improving physical fitness and physiological adaptation of young students to the requirements, which will be needed in the future profession needs.

Analysis of "Regulation on physical education and mass sports in higher education" that in general they don’t consider learning the specifics for future careers and are not focused on solving problems laying in the foundations of a healthy lifestyle, strengthen the health of students, improve their physical development and developing the necessary physical qualities.

The intensity of the learning process in higher educational institutions increases psychological stress and has raised the question about the role of sports and recreational activities in the daily lives of students. Physical education plays important role in maintaining and strengthening the health of students, improvement of the quality of life, forming important professional qualities of the individual. It is proved that systematic physical exercise increases the neuro-psychological resistance to emotional stress, maintains mental performance, enhances the success of students [1, 2, 7].

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According to scientists' researches in past years of Ukraine there is a deterioration of population’s health status including youth. In the years 2000-2010 the number of population decreased by 2.5 million people due to increased mortality (18.6%) and falling birth rate (35%). The average life duration for men decreased by 2.4 years and for women 0.9 years. Disease structure is dominated by chronic diseases. The prevalence of cardiovascular disease increased by 1.9 times; whereas cancer – 21%; asthma – 39.3%; Diabetes – 11.4%; on average every 5th resident suffers because of hypertension. The number of students according to their health levels are in the main groups decreased from 87.4% to 69.2%. Number of preparatory and special medical groups in higher education has increased from 5.76% in the first year going to 18.68% in the fourth [1, 5, 8].

For the last time there is a growing contradiction between the level of social needs and the effectiveness of physical education students. To solve this problem, there are a lot of different researches. Particularly, it’s an offer to improve the methods and forms of conducting classes [5], to improve software and regulatory support and enhance professional-applied physical training [7], to build a healthy lifestyle, to increase physical activity of students [8], to increase interest in physical education and improve the system evaluation of physical fitness [6], to make a new modern methodological support subject "Physical education" [3].

The issue of healthy lifestyles in modern Ukrainian society is very important for sustaining economic growth, country needs a healthy nation in a position to ensure this growth.

One way is optimizing physical education of students, differentiation and individualization of the learning process is the organization of sports and fitness sessions and self-exercises [1, 5].

The ratio of education values, making connection of physical education with the following professional activities and encourage students to support healthy lifestyle will get positively motivated accordingly transformation external stimulus influences on their personality in encouraging internal power that motivate internalization [4, 7].

The aim and objectives of researches: based on analysis of survey results, to determine the ratio of students to physical education and healthy lifestyles and their own assessment of physical fitness and priority of physical qualities.

Material and methods of research: The study was carried out on the basis of Kharkiv National Economic University and Kharkiv National Technical University of Agriculture Petro Vasilenko. The survey of 166 first year students containing 77 boys and 89 girls. To achieve the objectives of the study the following methods were used: analysis of scientific and methodological literature and information, sources from the Internet, teaching observation, questionnaires, mathematical statistics methods, discussion and synthesis of research results.

The main material research. The basis of the criteria laid analysis associated with the confirmation that today, the interest of students to physical education, healthy lifestyles is harshly reduced, all that is inter connected with studies of mass physical culture, sports and recreational activities.
Solving the problem of succession at the intersection of "School – Higher Educational Institution" is limited to organizing training courses, the aim of which is to prepare high school graduates for entrance exams. But practically the problem of "complex succession" that would improve physiological, psychological and social adaptation of prospective students is not considered [7].

In order to detect the attitude of students towards healthy lifestyle and physical fitness, we have prepared a questionnaire and conducted survey. The study produced the following results (Table. 1):

### Table 1

**Student’s ratio to a healthy lifestyle and physical education**

<table>
<thead>
<tr>
<th>№</th>
<th>The content of questions and answers</th>
<th>Total students (%)</th>
<th>Boys (%)</th>
<th>Girls (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ratio to a healthy lifestyle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positive (follow HLS)</td>
<td>69,4</td>
<td>62,3</td>
<td>76,4</td>
</tr>
<tr>
<td></td>
<td>Positive (but not respected HLS)</td>
<td>30,7</td>
<td>37,7</td>
<td>23,6</td>
</tr>
<tr>
<td></td>
<td>Indifference</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>Bad habits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Answer &quot;no&quot;</td>
<td>68,8</td>
<td>62,3</td>
<td>75,3</td>
</tr>
<tr>
<td></td>
<td>Answer &quot;yes&quot;</td>
<td>14,3</td>
<td>19,5</td>
<td>9,0</td>
</tr>
<tr>
<td></td>
<td>«Sometimes» (drink or smoke)</td>
<td>16,9</td>
<td>18,2</td>
<td>15,8</td>
</tr>
<tr>
<td>3.</td>
<td>Ratio to physical education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positive (realize the usefulness exercises)</td>
<td>84,8</td>
<td>83,1</td>
<td>86,5</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Rather positive than negative</td>
<td>15,2</td>
<td>16,9</td>
<td>13,5</td>
</tr>
<tr>
<td></td>
<td>Rather negative than positive</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4.</td>
<td>Consider themselves physically active</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;Yes&quot; (engaged in sports and fitness clubs)</td>
<td>23,4</td>
<td>29,9</td>
<td>16,9</td>
</tr>
<tr>
<td></td>
<td>&quot;Enough&quot; active (lead HLS)</td>
<td>38,9</td>
<td>35,1</td>
<td>42,7</td>
</tr>
<tr>
<td></td>
<td>Doing exercises only in the class for school (on schedule)</td>
<td>37,7</td>
<td>35,0</td>
<td>40,4</td>
</tr>
<tr>
<td></td>
<td>Leading a sedentary lifestyle</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.</td>
<td>Assessment of their own level of physical fitness (being prepared)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>13,1</td>
<td>18,2</td>
<td>7,9</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>77,5</td>
<td>66,2</td>
<td>88,8</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>9,5</td>
<td>15,6</td>
<td>3,3</td>
</tr>
<tr>
<td>6.</td>
<td>Satisfied with their physical fitness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;Yes&quot;</td>
<td>40,7</td>
<td>53,2</td>
<td>28,1</td>
</tr>
<tr>
<td></td>
<td>&quot;No&quot;</td>
<td>59,4</td>
<td>46,8</td>
<td>71,9</td>
</tr>
<tr>
<td>7.</td>
<td>Participation in sportive events held in school</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Taking part</td>
<td>27,7</td>
<td>35,1</td>
<td>20,2</td>
</tr>
<tr>
<td></td>
<td>Do not taking part</td>
<td>72,4</td>
<td>64,9</td>
<td>79,8</td>
</tr>
</tbody>
</table>

Analysis of the results shows that 69.35% of students have a positive view on healthy lifestyle. In addition, 30.65% also have a positive attitude but do not follow (not committed to this process).
The research showed that a positive attitude to healthy living is lower than a positive attitude towards physical education (Fig. 1).

The majority of students, 68.8% (62.3% boys and 75.3% of girls), said that they don’t have bad habits. A positive attitude towards physical education observed in 84.8% of students surveyed; "More positive than negative" 15.2% from 100%.

The results show that students as a part of society, reflecting its essence and they understand the benefits of a healthy lifestyle but due to various reasons, don’t follow requirements.

Results of priority physical qualities and their own level of physical fitness are presented in Table 2.

**Table 2**

<table>
<thead>
<tr>
<th>№</th>
<th>Content questions and options for answers</th>
<th>Total Students (%)</th>
<th>Boys (%)</th>
<th>Girls (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The most important physical qualities (as a priority)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>endurance</td>
<td>41,8</td>
<td>36,4</td>
<td>47,2</td>
</tr>
<tr>
<td></td>
<td>power</td>
<td>14,9</td>
<td>26,0</td>
<td>3,8</td>
</tr>
<tr>
<td></td>
<td>speed</td>
<td>7,6</td>
<td>11,7</td>
<td>3,4</td>
</tr>
<tr>
<td></td>
<td>flexibility</td>
<td>12,2</td>
<td>5,2</td>
<td>19,1</td>
</tr>
<tr>
<td></td>
<td>agility</td>
<td>13,7</td>
<td>10,4</td>
<td>16,0</td>
</tr>
<tr>
<td>2.</td>
<td>Assessment of their own level of physical fitness (the best mark)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
endurance | 11.9 | 10.4 | 13.5  
power     | 22.3 | 31.2 | 13.5  
speed     | 16.1 | 22.1 | 10.1  
flexibility | 15.3 | 10.4 | 20.2  
agility  | 14.9 | 14.2 | 15.7

According to the survey results, the importance of physical qualities, students placed them in the following order: endurance – 41.8% (36.4% boys and 47.7% of girls), force – 14.9% (26.0% boys and 3.8% of girls), agility – 13.7% (10.4% boys and 16.0% of girls), flexibility – 12.2% (5.2% boys and 19.1% of girls) and the rate 7.6% (11.7% boys and 3.4% of girls). A proper level of physical fitness rated as follows: power – 22.3% (31.2% boys and 13.5% of girls), the rate – 16.1% (22.1% boys and 10.1% of girls), flexibility – 15.3% (10.4% boys and 20.2% of girls), agility – 14.9% (14.2% boys and 15.7% of girls) and endurance – 11.9% (10.4% boys and 13.5% of girls).

As a result of the survey also found that sports students prefer: table tennis – 18.15%; volleyball – 13.5%; football – 12.8%; aerobics – 11.55%; wrestling – 10.05%; swimming – 8.2%; basketball – 6.55%; athletic gymnastics – 5.55%; athletics – 5.2%; badminton – 3.05%; improving gymnastics – 3.45%; handball – 1.95%. The results can be used in the formation of sports and recreational sports teams for the next academic semester or year.

Conclusions.
1. The results of the study do not support the data that there is a significant decline in interest in students towards healthy living and physical fitness currently.
2. The reasons for obtaining high positive results is: Firstly, a survey was conducted among students, who attended classes in physical education; Secondly, students realize the positive impact of physical education classes and a healthy lifestyle for their own health but for various reasons, they have not committed to this process; Thirdly, the desire to show their best side, even during anonymous survey that is like publication what is wished as own thinking.
3. In order to attract more students to a healthy lifestyle and to increase interest: motivation sessions with various kinds of sports and recreational activities are necessary, to implement a learning process of modern innovative curriculum, implement the principle of individual approach (consider the wishes and physical abilities of students), conduct various sports events and updating the material and technical base of the institution.

Further researches are planned to be conducted for improvement of general endurance of students through the use of complex aerobic exercise character.

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FEATURES OF THE APPLIED PHYSICAL PREPAREDNESS OF THE FIRST-YEAR STUDENTS OF A LEGAL HIGHER EDUCATIONAL INSTITUTION

Abstract. Purpose: to study a level of the development of separate applied physicality of the 1st year students of a legal higher educational institution. Material and Methods: students of the 1 course of Institute of preparation of investigative specialists for the Ministry of Internal Affairs of the legal higher educational institution in number of 83 girls and 94 boys took part in researches. Methods were used: analysis and generalization of scientific and methodical literature, pedagogical test, methods of mathematical statistics. Results: it is fixed that one of the component of preparedness of a university graduate for the performance of his professional duties is the level of their health, physical and psychological preparedness. The research of an extent of the performance of one of tasks of the applied physical training of students is conducted – the development of the applied main physicality: general endurance and force. Following the results of the implementation of the running test of Cooper it was revealed that girls have a low degree of physical working capacity, boys – average. It is also defined that force of muscles of an abdominal tension and muscles of feet are poorly developed at students of both sexes. Force of muscles of an upper shoulder-girdle is developed rather good at boys, girls – haven't enough. Conclusions: researches showed that the process of classes on physical training of students – future investigative specialists of the Ministry of Internal Affairs is needed to be specialized according to the professiogramm of an investigator and to pay a special attention to the development of applied general and special qualities.

Keywords: students, a work of an investigator, applied physicality, force, endurance, level of the development.

Introduction. Now the educational process in HEI is gradually reorganized according to "The law of higher education of Ukraine from 01.07.2014". Information about closing, reorganization, merger of HEI of Ukraine because of their surplus, non-importance of graduates, and their non-competitiveness in labor market is often traced in mass media. Therefore today the question of the need of the interaction of an employer with higher education institution "for the purpose of preparation of the competitive human capital for hi-tech and innovative development of the country, self-realization of the personality, ensuring requirements of the society, labor market and the state in qualified specialists" is particularly acute [3]. One of the professional duties making preparedness of a university graduate for the performance is the level
of his health, physical and psychological fitness. These components have an important value at the preparation of investigative specialists for MIFU.

In recent years the questions lighting the system of professional-applied physical preparation of student's youth were lifted in works of many scientists. So, the subject of special physical preparation in the system of professional-applied training in higher educational institutions of military formations of Ukraine, namely the Ministry of Internal Affairs and the Ministry of Defense, tax inspection was lit in the works of E. A. Yarmoshchuk, 2002; Yu. P. Sergiyenko, 2005; O. M. Lavrentyeva, 2012; O. A. Yareshchenko, 2012; I. Yu. Mikhuta, 2014. Bases of PAPP of students of technical colleges and modern approaches to this type of physical preparation were considered by R. T. Rayevsky, 1985; G. G. Lapshina, R. L. Dmitrov, 2013; V. G. Fotinyuk, 2013; T. V. Ludovic, 2014. In physical training of students of legal higher education institutions A. N. Ulanovskyi, A. P. Karpovich, L. V. Lisovskaya, 2014 were engaged in the development of innovative technologies. At the same time the scientific data connected with researches of professional-applied training of specialists of a legal profile, their physical development and the level of health in native scientific and methodical literature are presented not enough.

Communication of the work with scientific programs, plans, subjects. The research was conducted according to the initiative subject of the RW for 2011-2015 of the chair of physical training No. 3 of National law university “Yaroslav the Wise law academy” and according to the Thematic plan of the research work of Kharkov state academy of physical culture for 2013-2015 on a subject 3.5.29. "The creation of standards and technologies of the formation of healthy lifestyle, technology of the improvement of quality and safety of food".

The objective of the research. In this regard studying of a level of the development of separate applied physical qualities of students of the 1 course of legal higher education institution was the purpose of this work.

Material and methods of the research: analysis and generalization of scientific and methodical literature, pedagogical testing, methods of mathematical statistics. Students of the 1 course of Institute of preparation of investigative specialists for the Ministry of Internal Affairs of National law university “Yaroslav the Wise law academy” in number of 83 girls and 94 boys took part in the researches.

Results of the research and their discussion. The investigator is an official who is authorized to carry out the preliminary investigation on criminal case, and also other powers provided by the criminal procedure legislation. A distinctive feature of working hours of the investigator is his non-normalized working day. Actually investigators carry out the considerable amount of works in Saturday and Sundays, not always have the right for a compensatory holiday after duty, use a lunch break not every day [2].

Standards of the criminal procedural code of Ukraine oblige the investigator to make an investigation of a criminal case in two-month time. Therefore often judge business qualities of the investigator, in particular, by number of the finished affairs by him in a month or in a year. Thus it is usually mentioned that in the two-month time established law term certain quantity of affairs are finished. However these
indicators serve not always as a measure of the productivity of work of the investigator [2].

Cerebration prevails in the work of the investigator. A third of all time leaves on the main work that is on the investigation of crimes. So, average data on expenses of time for an oral interrogation at investigators of prosecutor's office make 41.2 min., and investigators of the Ministry of Internal Affairs have 37.4 min. Meanwhile more than a half (investigators have prosecutor's offices – 52%, and investigators of the Ministry of Internal Affairs have 58%) interrogations proceed less than half an hour. Interrogations make over one and a half hours rather small part (investigators have prosecutor's offices – 6%, and investigators of the Ministry of Internal Affairs have 4% of all interrogations). Investigators make resolutions a little more often than once in two days, spending for this kind of activity for about 40 min. Also they make indictments once in eight-nine days, spending for this kind of activity 125-145 min. [2].

At investigators a lunch break proceeds for about 50 min. Investigators who have seven and more cases more often than others, don't use the right for a lunch break in the production. Investigators spend over a third of time for the labor processes connected with the letter. Therefore the use of computers is obvious. They, first, significantly reduce time costs almost of all labor processes connected with the letter, secondly, considerably facilitate the work of investigators, thirdly, considerably increase the culture of the investigative production [2].

Proceeding from the above stated, a working pose of an investigator – is free that means to stay in sitting positions, standing, in walking.

The greatest interest presents a memory role in the accumulation of an experience and the preservation of knowledge to psychology of an investigator. Character of requirements which are imposed to an investigator does arbitrary, semantic memory and its qualities, as large volume, high precision and readiness main in his profession. Free, purposeful attention, thinking, perception, imagination, speech aren't less important [1; 2].

The activity of an investigator is characterized by a high level of the responsibility, and also the excessive level of an emotional pressure. According to V. M. Retnev (2007), the following professionally caused diseases are inherent in investigators: cardiovascular and respiratory systems, central nervous and peripheral systems, digestive and musculoskeletal system.

Owing to the above stated, problems of professional and applied physical training of an investigator are:

1. The primary development of applied main physical qualities: general endurance, force, speed.

2. The primary development of applied special qualities: long working capacity, mental endurance, ability to long concentration, switch-controlling, fast orientation in new conditions, "noise stability" (ability to work at an action of foreign irritants), and also emotional stability and self-control.

3. The primary development of applied mental qualities of:
   – free and involuntary attention, and also its properties – volume, density (concentration), distribution, switch-controlling and stability;
– memory (volume, speed, accuracy, durability of storing and readiness for reproduction);
– thinking (evident and effective, evident and figurative, quick, abstract); besides, discursive and intuitive thinking;
– imagination (recreating).
4. The acquisition of necessary applied knowledge and methodical-practical skills.

Applied knowledge has to be acquired by students in the process as educational forms of classes (practical, methodical, control), and after-hour (morning exercises, classes in sports sections, participation in competitions, recreational classes in a day regimen etc.) [6].

On methodical-training classes students overtake methods and ways of sports and sports activity for the achievement of educational, professional and vital purposes of the personality. The special attention is paid to a technique of application of the exercises promoting working out, rest and restoration of an organism after the working day.

Educational- training classes are directed on practical activities with the use of exercises from different types of sport (track and field athletics, different types of gymnastics, swimming, volleyball, basketball, football, table tennis) for the achievement of the physical perfection directed on the formation of physical qualities and properties of the personality.

Applied special qualities that are properties of an organism providing its resistance to the influence of adverse factors of the professional activity are developed at the investigator gradually in the course of labor life. However this process is very long and not always comes to the end successfully. The regular and purposeful application of means of physical culture allows accelerating the development of special qualities, to develop them to a necessary level.

The ability to maintain working capacity long is closely interconnected with endurance and with its psychological aspect – strong-willed efforts. The exercises demanding overcoming of a psychological threshold "I can't" are for this purpose put into the practice. However in each case, it is necessary to individualize strictly the process of selection of such means and their dosage for each student.

The development of mental endurance, and also ability to long concentration, switch-controlling, "noise stability" of a future investigator is promoted by sports, especially so-called "distortion, favoring" of a game by a referee. Besides, traditional and oriental martial arts are widely used. The development of emotional stability and self-control is promoted by exercises from gymnastics: on shells, acrobatic exercises; exercises from track and field athletics, swimming, and skis.

First of all the development of applied main physical qualities forms a basis for the formation of the above-mentioned qualities of an investigator: general endurance and force.

By means of the 12-minute running test of Cooper at which the performance more than 2/3 muscle bulks is involved in work and loading has the essential impact on the systems providing the muscular activity, first of all on cardiovascular and
respiratory, we estimated physical efficiency of students. Results are presented in pic. 1.

![Pic. 1. Average results of 12-minute running test of Cooper, m](image)

Proceeding from standards to this test, the girls have a low degree of physical working capacity, the boys – average [10].

We also investigated various manifestations of power abilities of students: power dynamic endurance (an emphasis having sat down, an emphasis lying; bending extension of hands in an emphasis lying; lifting in a set from nominative lying, hands behind the head; pulling up in hanging); and also glycolytic working capacity (jumps on a jump rope) which results are presented in pic. 2.

![Pic. 2. Average results of performance of test exercises by students of the 1st course](image)

The analysis of the results presented on pic. 2, and their comparison with the norms presented by L. P. Sergiyenko, 2002, and V. A. Romanenko, 2005 testifies to the following:

- results of the implementation of the test "lifting in a set in 1 min." are low both at boys, and at girls and don’t meet the age standards;
results of the performance of the test exercise "bending extension of hands in
an emphasis lying" speak about a high level of the development of dynamic power
endurance at boys and low – at girls;
– students, according to standards, consulted on "perfectly" with the test
exercise "pulling up on a high crossbeam";
– average result of the performance of the test exercise "an emphasis sitting, an
emphasis lying" both at boys, and at girls is rather low and doesn't meet the average
age standards;
– results of the implementation of the test "jumps on a jump rope" shown by
students are rather low and don't meet the age standards.

Proceeding from the above stated, it is possible to draw the following
conclusions:
1. The low-mobility is characteristic for the investigative work during the
certain periods which leads to the decrease of a tone of the central nervous system,
worsens regulation of blood circulation, breath and digestion that is badly reflected in
health of the investigator and in results of his work.
2. It is necessary to pay a special attention to the solution of problems of
professional and applied physical preparation in the course of classes on physical
training of students – the future investigative specialists of the Ministry of Internal
Affairs, except the general tasks.
3. The level of the development of applied main physical qualities was defined
within this work, investigating the extent of the performance of one of problems of
applied physical training of students: general endurance and force. So, it was revealed
by the following results of 12-minute run that the girls have a low degree of physical
working capacity, the boys – average. It is also defined that force of muscles of an
abdominal tension and muscles of feet is poorly developed at students of both sexes.
Force of muscles of the top humeral belt at boys is developed rather well, girls – isn’t
enough.

Prospects of the further researches will consist in the research of the extent
of the performance of problems of applied physical training of students by the
definition of dynamics of a level of the development of their applied physical
qualities.

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RELATIONSHIP BETWEEN OF SPECIAL PREPAREDNESS AND BIOENERGETICS LEVEL OF FOOTBALL-PLAYER AGE 13–14 YEARS OLD AND TYPOLOGICAL FUNCTION OF CENTRAL NERVOUS SYSTEM

Abstract. Purpose: to find out which individual typological characteristics of higher nervous system is genetically fixed and establish their relationship with indicators of specially trained and bioenergy players 13–14 years. Materials and Methods: the players 13–14 years determined individual typological properties sensor-motor reactions, physical, technical and tactical preparedness and expert evaluation of play activities. Bioenergy indicators defined for rapid diagnosis using "D & K-Test". Results: revealed a strong dependence of individual indicators of physical, tactical, technical, training and bioenergetic characteristics of genetically determined individual typological properties of functional mobility of the major players nervous processes. Conclusions: the relationship of genetically determined individual typological properties (FRNP) with some indicators of physical, technical, tactical training, bioenergetic metabolism and expert game players of 13–14 years.

Keywords: heredity, twins, mobility, strength, balance nervous processes, typological features, technical, tactical, physical preparedness, football players 13–14 years old, bioenergy.

Introduction. The differentiated approach to the organization of the training process is widely used in modern conditions of training of football players [2; 3; 6]. The main direction of the realization of the differentiated approach is the usage of a large number of rational options and strategy of long-term preparation for a full individualization at a stage of the highest sports skill [7; 8; 13]. Differences of physical, technical or functional fitness of football players, game role, constitution types, biological age, personal features, bioenergetic characteristics act as criteria of the differentiated approach, etc [4; 16; 18; 20]. The interest is the search of criteria which differ in the resistant biological nature and genetically determined markers which are the most informative concerning the management of individual sports preparation and its forecasting [1; 14; 15; 17; 19]. We assume that such criteria are answered by individually typological properties of the nervous system: functional mobility, force and steadiness of nervous processes.

The analysis of literature showed that there is no detailed information on character and features of dynamics of physical, technical, tactical fitness and a condition of bioenergetic characteristics, their aged features depending on typological features of football players in the majority of scientific works of a sports orientation.
There are no works in which individually typological properties of the nervous system would act as criterion of the differentiation. There aren't found out possibilities of their use for monitoring of special preparedness and reserve opportunities of football players.

In general the analysis of scientific works concerning a problem testifies to the existence of an objective contradiction between a need of the implementation of the differentiated approach to the organization of the training process of football players and an insufficient scientific preparedness of a question taking into account features of individually typological properties of the nervous system of football players [6; 10; 16]. Therefore in the basis of the work are put the analysis of regularities of the genetic dependence of individually typological properties of the highest parts of the nervous system and sensor-motor reactions and their communication with bioenergetic characteristics, technical, tactical, physical fitness of football players of 13-14 years old.

**The aim of the research:** to find out which individually typological properties of the highest parts of the nervous system are genetically fixed, and to establish their connection with indicators of special preparedness and bio-energetic of football players of 13-14 years old.

**Material and methods of the research.** First of all typological properties determined by the computer device Diagnost-1M in 13 couples of monozygotic (MZ) and 12 – dizygotic (DZ) teenage-twins who didn't play sports, and in 32 football players of 13-14 years old: functional mobility (FMNP), force (FNP) and steadiness (SNP) of nervous processes, and also the latent periods of simple (SVMR), difficult reactions of a selection of one (RS1-3), and two (RS2-3) from three signals, and also the time of the central information processing (CFI) [11].

The FMNP level was determined behind the results of processing of difficult visual information in the mode of "the imposed rhythm" which consisted in the differentiation of positive and brake irritants (geometrical figures). The maximum rate of the processing of signals at which the surveyed made no more than 5,0-5,5% of mistakes was a quantitative index of FMNP. The higher was the rate of processing of information, the highest FMNP was. FNP was judged behind an indicator of the operability of a cerebral cortex which estimated behind the quantity of the mistakes (%) made by the investigated when performing the whole task. The definition of SNP provided the registration of accuracy of reactions to a mobile object. SNP was judged behind the total size of reactions which advanced or were late. The less sum of deviations of motive reactions (in ms), the higher SNP was.

The definitions of the destiny of hereditary and environment factors in formation of FMNP, FNP, SNP and SVMR, RS1-3, RS2-3 and CFI were carried out behind the coefficient of hereditability of Holsinger (H). For each indicator coefficients of interclass correlation (r) for MZ (rmz) and DZ of twins (rdz), and then H behind a formula: \( H = (r_{mz}-r_{dz}) : (1-r_{dz}) \) [1; 9; 15] were calculated.

In the subsequent conducted researches in which 32 football players of 13-14 years old took part who studied in CYSS. Indicators of individually typological properties (FMNP, FNP and SNP) and sensor-motor reaction (SVMR, RS1-3, RS2-3 and CFI) were defined at football players, as well as at twins.
Physical fitness of young football players was determined by indicators of test tasks for the manifestation of dexterity, high-speed and high-speed and power abilities and endurance [7]. The level of technical preparedness was estimated by means of control exercises: juggling, dribbling and blows on gate on accuracy [8]. The tactical thinking of football players was estimated by means of the automated technique of "FootBallTest" [12].

Bioenergetic indicators defined by the express diagnostics of a functional state and reserve opportunities of an organism with the use of the computer device D&k-Test [5]. The expert assessment of the game activity of football players was carried out by the group of skilled coaches [10].

The received statistical material was processed by means of the computer program Microsoft Excell by methods of the correlation analysis and the reliable differences of average values.

Results of the research and their discussion. Results showed that average values of typological properties of the highest departments of the central nervous system in MZ and DZ groups were almost identical, except for a difference in the FMNP level indicators which were slightly higher in MZ twins (p < 0,05). It was found out that pair viability for typological properties of the highest departments of the central nervous system both for MZ group, and as DZ is higher, than for different behind the complexity of sensor-motor functions.

The analysis of results for group of MZ twins showed that correlations of indicators of properties of the main nervous processes were within 0,88–0,73 (on average 0,81), in DZ – from 0,65 to 0,51 (on average 0,57) at (p<0,05). When studying internally pair viability in groups of MZ and DZ twins found out that all studied indicators of typological properties are characterized by the highest level of correlation in MZ, than in DZ of couples that testifies to the expressed genetic influence on these indicators (p<0,05).

The coefficient of hereditability of Holsinger (H) testifies to the differentiated influence of genetic and environment factors on indicators of different individual properties of the nervous system which for conditions is more than 0,5 points to a relative advantage, and more than 0,6 is a criterion of an absolute advantage of genetic factors [6; 10; 13]. In our experiences the coefficient of H was high (0,65) only for one of the studied indicators: FMNP. This indicator is slightly below (0,56–0,52) for FNP, SNP and CFI. Values of H for SVMR and RS1-3 and RS2-3 – 0,29–0,20 were much smaller that testifies to the overwhelming dependence of these indicators on the environment [1; 9; 15].

Thus, the results of the researches which are conducted on the same group of twins, showed that the participation of genetic and the environment factors in the formation of specific features of sensor-motor and typological properties of the highest departments of the central nervous system is appeared in different ratios. The expressed hereditary conditionality for FMNP (70%) and the relative advantage of genotypic factors (50%) – for FNP, SNP and CFI are found. The advantage of phenotypic factors is established for indicators of SVMR and RS1-3, RS2-3. For them Holtsinger's coefficient didn't exceed 30%.
The detection of a high dependence from a genotype of FMNP and a little smaller FNP and SNP allowed us to pass from FMNP to the research of dependence of a special preparedness and a condition of bio-energetics of football players of 13-14 years old.

Correlations of FMNP with indicators of physical fitness of football players of 13-14 years old are presented in pic. 1.

Pic. 1. Correlations of the functional mobility of nervous processes with indicators of physical fitness of football players of 13-14 years old

It is evident from the results that indicators of physical fitness of the examined football players have a reliable communication with FMNP (r=0.29–0.31). So, FMNP authentically correlated with indicators of high-speed and power abilities, in exercises – a broad jump from a place and a throwing of a ball on range and with endurance indicators (The Cooper test).

Correlations of FMNP with indicators of technical training, tactical thinking, and expert assessment of the game activity of the examined football players of 13-14 years old are presented in pic. 2.

It is visible from the provided data that reliable correlation dependence exists only between FMNP and an indicator of juggling of a ball (r=0.38). There aren’t established correlations between the investigated individually typological of SNP property and indicators in other test exercises on technical training. During the research the reliable correlations between FMNP with indicators of tactical thinking of football players in attack and defense (r=0.29–0.31) and an expert assessment of the game activity (r=0.32) of the surveyed players were found.
Pic. 2. Correlations of the functional mobility of nervous processes with indicators of technical and tactical preparedness and an expert assessment of football players of 13-14 years old

Correlation of indicators of a bioenergetic metabolism of FMNP of football players of 13-14 years old are presented in pic. 3.

Pic. 3. Correlations of the functional mobility of nervous processes with indicators of bioenergetic metabolism of football players of 13-14 years old

As it is visible from the pic. 3 the force of communications of FMNP with indicators of bioenergetic metabolism of football players of 13-14 years old had a versatile character. So, the correlation dependence of FMNP with indicators of GL and TANM was established, it fluctuated within \( r=0.39 \text{–} 0.45 \). The correlation dependence isn't established between FMNP and other indicators of bioenergetic metabolism (GMC, CF and MOC).

Thus, as a result of the researches it is revealed that indicators of bioenergetic metabolism and physical and technical fitness, tactical thinking, in attack and defense, and also an expert assessment of football players of 13-14 years old have the reliable communication with FMNP \( r=0.28 \text{–} 0.45 \) that points to the dependence of
the studied indicators from individually-typological properties – the functional mobility of nervous processes.

The results and the conclusions of the work promote the deepening of understanding of the necessity of application of the differentiated approach to the organization of the training process of young football players taking into account individual typological properties of the highest departments of the central nervous system.

**Conclusions:**

1. The expressed hereditability conditionality of the functional mobility of the main nervous processes, forces, steadiness and the time of the central information processing is found.

2. The connection of FMNP with the separate indicators of physical, technical, tactical fitness, bioenergetic metabolism and an expert assessment of the game activity of football players of 13–14 years old is established.

**Directions of the subsequent researches.** The prospect of the subsequent researches consists in the studied regularities of the dependence of individually typological properties of the highest departments of the central nervous system with the general and special preparedness of football players of a different age and a game role.

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FORMATION AND DIAGNOSTICS LEVELS OF EDUCATIONAL ABILITIES OF STUDENTS IN PHYSICAL EDUCATION

Abstract. **Purpose:** specify and theoretical basis for the content of educational tasks methodical practice, as a means of diagnosing the level of formation and pedagogical skills of students. **Material and Methods:** the analysis of more than 20 references, 12 work programs in the discipline "Physical Education" HEI III–IV accreditation levels. **Results:** disclosed system of pedagogical skills, providing social and personal competence in the sphere of physical culture, which forms during the methodical practice through completing quests. **Conclusions:** this study allows a qualitatively new level to solve the issues of forming and diagnostics level pedagogical skills of students in physical education.

**Keywords:** skills, students, teaching, tasks, methods, and practice.

Annotation. Formation and diagnostics levels of educational abilities of students in physical education. **Purpose:** Specify and theoretical basis for the content of educational tasks methodical practice, as a means of diagnosing the level of formation and pedagogical skills of students. **Material:** The analysis of more than 20 references, 12 work programs in the discipline «Physical Education» HEI III-IV accreditation levels. **Results:** Disclosed system of pedagogical skills, providing social and personal competence in the sphere of physical culture, which forms during the methodical practice through completing quests. **Conclusions:** This study allows a qualitatively new level to solve the issues of forming and diagnostics level pedagogical skills of students in physical education.

**Key words:** skills, students, teaching, tasks, methods, and practice.

**Introduction.** One of the tasks of discipline «Physical education», which follows from purposes of work program this educational discipline for chosen kind of organized physical activity is ensuring the appropriate level assimilation the system of skills, which connected with methodical and organizational basics of physical culture. However, nowadays organization of educational process at the HEI determines the applicable standards and requirements to content, volume and level of training students, approved by the Ministry of Education and Science of Ukraine in 2003 [9].
Besides, despite significant advances in the management system of physical education at the universities, the problem of teaching methods has several outstanding aspects, caused by, first of all, insufficient account of specificity of education, which depends from the desire of students to take part in the selected kind of organized physical activity. For many teachers, the content of unspecialized education in the physical culture is the common results of sport activity, which students should realize. This teachers, as a rule, don’t consider the formation of a system of physical culture in general, but organize training study material, which they, as specialists in a particular area, shows as a fragment of the content of sports activities [1, 2, 5]. In fact, translation of the content of sports training in the content of the training material is much more complicated process. After all, there is a new, high-quality special system of knowledge and skills, which are integrated still not known elements. Its ordering essentially depends on how well the individual components of sports training covered by the general system-forming factor which is the purpose of discipline – the formation of social and personal competence in the sphere of physical culture [6, 7, 8].

The different aspects of forming of physical culture of personality of students found the reflection in works [5, 7, 8, 10]. However much most scientists set before itself the problem to probe facilities of diagnostic of level of pedagogical abilities as a driving member of cognizable process of physical education.

Contradictions between the requirements of the education system to the ability of experts to solve problems activity, connected with rest, physical and cultural development and the traditional means of training of teaching skills in physical education highlights the need for deeper and radical improvement of educational tasks methodical practice.

**Purposes, tasks, material and methods of work.**

The purpose of the research is to specify and theoretical underpinnings of the content of educational tasks for methodological practice as means of formation and diagnostics level pedagogical skills of students. Methods and organization of research: a review of scientific and methodical literature, theoretical analysis and synthesis. The study was conducted at the Department of Physical Education and Sport Semen Kuznets Kharkiv National University of Economics.

**Results.** Skill system that provides social and personal competence in the sphere of physical culture, forms during the methodical practice. Methodical practice – one of the sections of the curriculum discipline «Physical Education» higher educational institutions of Ukraine. It is closely connected with the theoretical and practical sections of the program. Methodical practice gives the opportunity to purchase certain pedagogical skills: team, methodical, organizational and management, and also It is an information base for the formation the means of diagnostic [4, 6].

Command abilities (necessary and sufficient information transfer that, where, when and properly to do) show up in formulation and serves of commands, pointing, lead through of instructing, show of judge gestures

A command is divided into preliminary and executive. A preliminary command is given distinctly, loudly and prolonged. Executive command after a pause
loudly, plangent and expressly. Command abilities are included by skills of pedagogical time, as an aggregate of simple abilities and skills, cooperative establishment correct mutual relations of leader with students, in the future chief with inferiors, and also skills of the use of pedagogical technique (domain command voice, by gestures, hardware’s of management, natural carriage).

Pointing differs terseness and given after the course of performance of physical exercise («Not incline a trunk!», «To draw aside socks!»).

Instructing is a necessary information transfer that, where, when and properly to do. Conducted before implementation of physical exercise. Forms the picture of correct space-time and power descriptions of motion. Importance of accident prevention, observance of rules of insurance and anchoring, is necessarily underlined at implementation of exercise.

Judge gestures. Judges must show official gestures reason of their whistle (character of error, fixed a whistle, or purpose of the settled interruption). A gesture must by sight clear and clear, maintained some time and, if he is shown one-arm, a hand corresponds the side of command which made bad a break or query.

Team skills are manifested in the formulation of commands, in the ability to achieve their accurate performance by students. They include skills pedagogical tact, as a set of simple abilities and skills which facilitate the identification of proper relations with leader and students, in the future boss with subordinates, as well as – the skills to use teaching techniques (possession, commanding voice, gestures, technical means of management, good posture).

Methodical skills include: skills of attention allocation and orientation in time, showing different techniques and activities; possession receptions insurance and assistance, the use of different methods and instructional techniques training, prevention and correction of errors; regulation of physical activity and density classes, the study of literature, etc.

Organizational skills include: navigation skills in the environment, determining students’ readiness for real sports practice, creative assimilation values of physical culture and its active use in the comprehensive development of personality, skills development and implementation of individual programs provide efficiency and accelerate its recovery by means of physical culture and sports in different types and conditions.

Managerial skills are manifested in ability to make informed decisions towards strengthening and development of personal and public health in the workplace, personal responsibility for health, use of rational methods of pedagogical influence on persons with whom he comes into communicative relations when organizing sports and recreation activities.

Acquisition of these pedagogical skills contributes to the formation of independence and responsibility in subsequent career.

For the formation and diagnostic of pedagogical skills develop pedagogical (educational) tasks. Pedagogical task is the result of understanding training or education purpose as well as conditions and modalities for its implementation in practice by teacher. The student, as a subject and object of interaction with teacher in process of solving pedagogical task, should have the growths in form of knowledge,
skill or personal quality. So far as each person is unique, solution of pedagogical task is complex and ambiguous. On this basis, pedagogical task is a universal learning activity.

The ratio between reference and target is considered in system of «set of tasks – plurality of goals», because in learning activity exactly the goal requires solution of number of tasks, and the same tasks contribute to achieving a certain goal. This leads to the following requirements for learning (pedagogical) task [5]:
– construction of not only one single job, but also of a set of tasks;
– in the construction of system of tasks it is necessary to achieve it provides not only the nearest training target, but also the other training targets;
– tasks must ensure mastering of the funds necessary and sufficient for the successful implementation of training activities;
– tasks must be built so, that the appropriate means of action, which are planned to assimilate in process of solving tasks, were a direct product of learning.

It should be noted that the effectiveness of training depends on how well the tasks were chosen. The character of tasks largely predetermines didactic difficulties. Therefore, key importance has distribution of learning tasks due to the level of complexity within a particular piece of learning. Content of famous didactic principle, from simple to complex, is that learning should be such that the complex tasks for students later become less difficult. Only such an approach provides a favorable emotional climate which is needed to invigorate interest in the acquisition of knowledge.

Methodical tasks were constructed in accordance with the followings requirements [4]:
– succession and intercommunication (each subsequent exercise is concerted on a structure with previous);
– gradual complication of exercises on aims and maintenance;
– correct distributing of implementation of exercises at times (short exercises are at first executed, between implementation of exercises there must be small intervals, the protracted and difficult exercises go followings);
– every exercise must have a certain goal;
– must exercise be executed under the direction of teacher and have a main goal – educational;
– all exercises must have simple reference basis of action;
– obligatory presence of motivation;
– obligatory is consideration of the executed exercise and his result.

Depending on the level of basic knowledge and skills, learning goals is proposed the following classification of tasks in content (Table 1):
– tasks for implement techniques;
– tasks for perform operations;
– tasks for the organization of pedagogical process.

Learning task also performs diagnostic function.

To provide feedback in solving learning task, in accordance with the purpose of training, it is necessary to establish a body of criteria to determine the characteristics and performance levels of educational stages of task. Tasks, solutions
of which are connected with the implementation of practical actions, are evaluated on
the following criteria: appearance, demanding, ability to directly and clearly give
commands, to require their implementation, to manage group; excellent show of
technology implementation; correctness of choice of place; possession of the mirror
showing; knowledge of terminology, matching of methods and instructional
techniques to learning tasks, ability to determine the status of learners, to identify and
eliminate the causes of errors, ability to classify, promptly and properly correct
errors; timeliness of care and insurance.

Tasks, related to determination of the formed level of pedagogical abilities, are
estimated on principle of the negative judging (table. 2).

The number of points is removed in error, determined by the decision of
teachers by peer review and approved by the head of the chair.

Assessment of tasks, which are connected with documentation, proposes the
abidance of recommended structure of making plans, namely: compressed
characteristic of the subject of assignment; analysis of existing approaches to the
solution of task and rationale for selecting a particular method, collection of objective
information about student which is necessary to solve the task; accordance of
documented way to solve the task to chosen methodology tailored to the individual
abilities.

Introduction in an university in the system of physical education of continuous
methodical preparation is instrumental in more effective forming of jurisdictions and
fixing of long-term knowledge due to step their receipt and necessity of permanent
actualization of already present knowledge.

So, there is a study and fixing of elementary methodical knowledge on the
initial stages of teaching, skills and abilities and getting a clear idea of possibility of
their application in the different spheres of life, that elementary literacy is formed in
the field of physical culture.

The successful passing of this stage is given by possibility to apply present
theoretical knowledge and known algorithms students to the decision of practical
tasks, for example: lead through of combatant receptions, conditionings in place,
afoot by different ways; teaching of separate element, reception; drafting of plan-
compendium of preparatory and final parts of employment.

Mastering in future of knowledge and abilities on discipline allows students
considerably open mind in relation to possibilities of the use of facilities of physical
culture.

Possibility effectively and creatively to apply pedagogical abilities of helper of
leader of employment opens up on this stage, abilities to notice errors. The level of
the purchased knowledge and abilities allows to be operatively-commuted from one
type of activity on other with the minimum expenses of time and efforts. For
example, lead through of basic, final part of employment, writing of plan-
compendium of employment, verification and estimation of level of physical
preparedness.

Accordingly, third stage organization and pedagogical process of physical
education control can’t be characterized the exceptionally certain aggregate of the
accumulated knowledge.
### Classification of pedagogical tasks for methodological practice

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Task for the implementation of techniques</th>
<th>Task for performing operations</th>
<th>Tasks for organization of the pedagogical process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basis (basic skills)</strong></td>
<td>Showing by teacher DTE description of the process in the textbook, workbook</td>
<td>Theoretical knowledge DTE original skills for the implementation techniques, display, explanation, documentation.</td>
<td>Theoretical knowledge of DTE formed the ability to perform the operation, showing processes by the teacher, description of the sequence in the program documentation.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Formation of elementary methodological knowledge, skills and abilities that match of demonstrated.</td>
<td>Acquisition of pedagogical skills of the head of physical training. Expanding of special knowledge, formation of skills to notice the error.</td>
<td>Improving complicated methodical skills in conducting training sessions. Improving of special knowledge.</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>Combatant of conducting receptions, general developmental exercises in place, moving in different ways. Training separate element, doses. Compose of the plan-compendium preparatory and final parts of the classes.</td>
<td>Conducting of primary and final part of the session. Writing a plan compendium classes. Testing and assessment of the level physical preparedness</td>
<td>Training exercises in their chosen sport, making the workout.</td>
</tr>
</tbody>
</table>

*Table 1*
Table 2
A list of common mistakes when performing tasks related to the definition of the generated level pedagogical skills

<table>
<thead>
<tr>
<th>#</th>
<th>General errors (examples)</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The absence of an approved plan (program) of solving the task</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Goal of the task is not declared</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Unkempt appearance or unnatural posture</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>A preparatory and executive command is not given, or by sight indistinguishable and unclear gestures (judge), or a command is not executed</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Terminology errors</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Absence of show of exercise</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Lack of explanation about the importance of exercise for students</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Irrational method of teaching is chosen</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Insurance and help is too late given</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Inability to determine the status of trainees</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>An element, reception, is wrong estimated, action or errors are not corrected in exercises</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Inability to keep discipline and organization</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Absence of analysis of degree of achievement of educational aims, raising of tasks for independent work</td>
<td></td>
</tr>
</tbody>
</table>

Only possibility to mobilize present knowledge and experience at the decision of arising up concrete vital task, ability to select from all aggregate necessary and optimum for a decision-making can mean forming of difficult methodical skills in the lead through of training-study employments, capture the method of lead through of other forms of employments by a physical culture. Thus the indicated stages are associate between it, and each of them comes forward basis for the successive forming of competence in the field of physical culture.

**Conclusions.** Conducted research allows on a qualitatively new level to solve the issues of forming and diagnostics level pedagogical skills of students in physical education. However, **further studies require** as conditions and methods of diagnosing the level of fitness of students, in particular, factor analysis of interdependencies to improve the quality of diagnosis and level of physical culture formed personality.

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STUDYING THE PHYSICAL LAWS OF MOVING BALL AT THE POWER SERVE IN JUMP

Abstract. Purpose: to study the dependence of the characteristics of the trajectory of moving ball, which determine the accuracy of the power serve in the jump, from the values of the relevant kinematics variables. Material and Methods: analysis of video filming, teacher observations, mathematical methods of processing the results. Results: the appropriate experiment, whose data were used to study the physical laws of moving ball, have been proposed and carried out. A detailed analysis of the characteristics of the ball trajectory, depending on the choice of the values of kinematics parameters such as speed, altitude and angle of moving ball relative to the playground at the initial time of performing serve, have been carried out. Conclusions: it is shown in particular that the precision of performing serve is substantially depended on the emission angle and the initial velocity of the ball.

Keywords: volleyball, trajectory, experiment, coordinates, target, efficiency.

Introduction. The modern volleyball makes more and more great demands to technical-tactical skill of volleyball players, and also of a level of the development of their physical capacities [6]. The sports technique of the performance of a serve of a ball in volleyball can be considered as a certain system of movements by means of which the corresponding motive problem is solved. The efficiency of this technique is defined by a high coordination of movements of a sportsman, their stability and rationality that allows reaching considerable results in the competitive activity. An important element of an approach to studying of a technique is a detailed consideration of its kinematic structure which includes the determination of duration of various phases, trajectories, speeds and accelerations of flight of a ball, etc. [1–3; 5; 7; 8]. Different types of filming and modern computer technologies are widely applied to this purpose now [3-5].

Studying of opportunities of the improvement of accuracy of its performance is of great importance for a solution of the problem of the increase of efficiency of a power serve in a jump. It is necessary to carry out the detailed analysis of various characteristics defining a trajectory of flight of a ball and to study their dependence on the corresponding kinematic variables for receiving the reliable conclusions connected with a problem of the improvement of accuracy of power serve in a jump. For this purpose we offered and made an experiment. Using the obtained data, the sizes were determined in works [3; 5] characterizing the movement of a ball after a serve, and also kinematic variables on which the trajectory of its flight depends. Processing of the received results by means of a method of average sizes is executed,
and also the correlation analysis of the corresponding characteristics is carried out.

**The objective of the research:** studying of the dependence of characteristics of a trajectory of a flight of a ball which determine the accuracy of the performance of a power serve in a jump, from values of the corresponding kinematic variables.

**Material and methods of the research:** analysis of video filming, pedagogical supervision, mathematical methods of processing of results.

**Communication of the research with scientific programs, plans, subjects.** The research is executed according to the plan of the research work of the chairs of Olympic and professional sport, the chair of sports and outdoor games of Kharkov state academy of physical culture. The direction of the research corresponds to a subject of the Consolidating plan of the research works in the sphere of physical culture and sport for 2011-2015 in the direction: "The improvement of the educational-training process in sports games" (the number of the state registration is 0111U003126).

**Results of the research and their discussion.** An important role in the increase of the efficiency of a power serve in a jump is played by the accuracy of its performance in a certain zone of a playground. In this work the technique is offered which is allowing volleyball players to improve a technique of such serve due to the corresponding adjustment of kinematic parameters of its performance for the purpose of an exact hit in a certain zone. We made the experiment for the practical realization of this technique which scheme is submitted in the pic. 1. Details of this experiment are described in works [3; 5].

![Pic. 1. The scheme of the executed experiment](image)

(a rectangle is near the beginning of coordinates – a video camera projection to a platform)

The volleyball court is represented in the pic. 1 on which the system of reference \(XY\) chosen by us is presented. The fixation by means of vertical shooting by a high-speed video camera of coordinates of a projection of the center of gravity of a ball both at an initial time point \(a_0\), and in a place of its landing \(a_m\) on a platform. The straight line piece which connects the points \(a_0\) and \(a_m\), is the line of crossing of the plane in which the corresponding trajectory of flight of a ball passes in each separate serve, with the playground plane. This line characterizes the direction of the flight of a ball after the performance of a serve, and the size of a piece of \(a_0a_m\) defines a range of its flight.
The initial speed $v_0$ of a flight of a ball, and also initial coordinates of the corresponding projection of a ball to a playground were defined by us when processing frames of video filming of the existential evolution of its flight by means of the software Dartfish [3; 5].

As a result of carrying out the experiment we obtained the data on the performance of 55 power serves in a jump in the form of the corresponding coordinates in the system of reference $XY$. In this work regularities of behavior of trajectories of the movement of a ball with the use of the obtained data are investigated in details. As an example we will give results of such analysis below, using the relevant data for the serve chosen by us in a series of attempts executed by the volleyball player who showed the best result. We will note that only as a result of the performance of this serve, the ball got precisely to a target [5]. We will assume for the descriptive reasons that the point $a_0$ (pic. 1) corresponds to a blow place on a ball by the player when performing the serve, and $a_m$ point – to a ball landing place. At the solution of the specified task we will choose a reference system in which the axis $z$ is perpendicular the platform planes from the beginning of coordinates in the point $a_0$, and the axis $y$ is directed along the line $a_0a_m$.

As a result of the serve the center of gravity of a ball receives an initial impulse $\vec{P}_0 = m\vec{v}_0$, where $m$ – the mass of a ball. The movement of a ball happens in the vertical plane $zy$ in which there are vectors $\vec{v}_0$ and $\vec{P} = mg$ (ball gravity, $\vec{g}$ – acceleration of gravity).

Further we won't consider a ball as a spatial object, and consider the air resistance. We will note that the accounting of these effects significantly won't affect regularities of the movement of a ball, however can introduce some amendments in numerical estimates of characteristics of a trajectory of its flight. In the case under consideration for the solution of the equations of the movement of a ball it is possible to receive analytical expressions which simplify carrying out the further analysis.

![Pic. 2. A trajectory of a flight of a ball (an asterisk – a grid arrangement on a playground)](image)

In the initial time point ($t=0$) coordinate of the ball $y_0=0$, and $z_0=h_0$, where $h_0$ – a ball height over the platform level at the time of a blow to it. An acceleration of a ball in any point of a flight is equal $\vec{g}$. In the case under consideration, the determined
by us initial speed of flight of the ball is $v_0=17.48$ m/s. The blow to a ball was executed by the player at height $h_0=3$ m.

Vector projections $\vec{v}_0$ on axes of coordinates $z$ and $y$ are equal respectively $v_{0z} = v_0 \sin \theta$, and $v_{0y} = v_0 \cos \theta$, where $\theta$ – the angle of a ball departure formed by a vector $\vec{v}_0$ and an axis $y$. As the vector projection $\vec{g}$ on an axis $y$ is equal to zero, a flight of a ball along this axis is uniform with a constant speed $v_{0y}$. The movement of a ball along an axis $z$ is variable with the acceleration $g$ and the initial speed $v_{0z}$ (the projection $\vec{g}$ to this axis is equal to $g$).

The equation of a trajectory of a flight of a ball can be written down in the following look:

$$z = h^* - (y - y^*)^2 g / 2v_0^2 \cos^2 \theta$$, (1)

The curve described by the received equation is the parabola turned by top up and passing through a point with coordinates $u=0$, $z=h_0$. It should be noted that in a real situation the air resistance which increases in proportion to a ball speed square, can distort a trajectory of its movement a little and affect, in particular, a flying range.

In the equation (1) a maximum height of a flight of a ball $h^*$ (a top of parabola) is defined by expression $h^* = h_0 + v_0^2 \sin^2 \theta / 2g$ over the level of a platform, thus the coordinate $y$ of its top is defined by a formula $y^* = v_0^2 \sin 2\theta / 2g$. The distance $L$ from the beginning of coordinates to a place of falling of a ball on a platform $a_m$ (a flying range) corresponds to value $z=0$. A departure angle $\theta$ at which the ball hits the point $L$, is possible to define from the following equation:

$$(1 + \tan^2 \theta) g L^2 / 2v_0^2 - L\tan \theta - h_0 = 0$$, (2)

As the angle $\theta$ wasn't measured in the experiment, we will find him, previously having defined a flying range of a ball $L$ (16,22 m), using the results of our measurements of coordinates of a departure of a ball given above after a serve and a place of its falling. From a quadratic equation (2), using values of the parameters stated above, we will define an angle $\theta$ which makes 4,45°. The maximum height of a flight of a ball after the performance of a serve $h^*=3,093$ m is reached at the distance $y^*=2,42$ m from the beginning of coordinates in the chosen reference system. Thus the ball flies by over a grid at the height of 2,46 m from the platform level.

Apparently from the equation (1), characteristics of a trajectory of a flight of a ball at a power serve in a jump depend on three parameters: $\theta$, $v_0$, $h_0$. It is of interest to investigate a behavior of a trajectory of a flight of a ball depending on the change of each of the listed parameters. For this purpose the corresponding calculations were carried out in the same plane $zy$ which is represented in the pic. 2. The results of various options of calculations in which we fixed values of two chosen parameters are given below, and the value of the third varied in some limits.

For options in which values of parameters $h_0=3$ m, $v_0=17,48$ m·s$^{-1}$ were fixed, and values of the angle $\theta$ were changed by us in some limits, the following results were received. So, at $\theta = 9^\circ$ a flying range of a ball $L$ considerably increased and
reached 19.14 m, having exceeded the distance from the purpose more than on 2 m. In this case the ball landed behind the front line of a platform. At a choice of a value of the angle $\theta$ is equal $6^\circ$ m $L=17.22$, i.e. a ball gets to platform limits, but considerably exceeds the distance to the purpose. At the insignificant reduction of the angle $\theta$ in comparison with its value $4.45^\circ$ the ball gets to a grid after a serve.

The dependence of a flying range of a ball on value of the initial speed $v_0$ it was investigated by us at the fixed $h_0=3$ m and the angle $\theta = 4.45^\circ$ and various values $v_0$. For the option of calculations with $v_0$ is equal 20 m · s$^{-1}$ and 16.5 m · s$^{-1}$ about flying range of a ball made 18.94 m and 15.19 m respectively. In the first case the ball departs out of platform limits, and in the second – gets to a grid.

<table>
<thead>
<tr>
<th>№</th>
<th>$\theta$</th>
<th>$v_0$</th>
<th>$h_0$</th>
<th>$L$</th>
<th>$h$</th>
<th>$y$</th>
<th>$\Delta h$</th>
</tr>
</thead>
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<tr>
<td>1</td>
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<td>17.48</td>
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<td>3.09</td>
<td>2.42</td>
<td>0.03</td>
</tr>
<tr>
<td>4</td>
<td>4.45</td>
<td>20.00</td>
<td>3.00</td>
<td>18.94</td>
<td>3.12</td>
<td>3.16</td>
<td>0.32</td>
</tr>
<tr>
<td>5</td>
<td>4.45</td>
<td>16.50</td>
<td>3.00</td>
<td>15.19</td>
<td>3.08</td>
<td>2.15</td>
<td>–</td>
</tr>
<tr>
<td>6</td>
<td>4.45</td>
<td>17.48</td>
<td>3.15</td>
<td>16.58</td>
<td>3.24</td>
<td>2.42</td>
<td>0.18</td>
</tr>
<tr>
<td>7</td>
<td>4.45</td>
<td>17.48</td>
<td>2.90</td>
<td>16.02</td>
<td>2.99</td>
<td>2.42</td>
<td>–</td>
</tr>
</tbody>
</table>

In the third option of calculations the dependence of characteristics of a trajectory of a ball on value of height $h_0$ was calculated by us at the fixed values $\theta = 4.45^\circ$ and $v_0=17.48$ m/s. At the chosen $h_0$ values which are equal 3.15 m and 2.9 m the flying range of a ball made 16.58 m and 16.02 m respectively. As a result in the first case the ball hit the specified mark, and in the second – the ball got to a grid.

Some characteristics of trajectories of the movement of a ball for the options considered above are presented in the tab. 1 ($\Delta h$ – a distance of the center of gravity of a ball to the upper angle of a grid over a place of its flight). The given values $\Delta h$ are the simplified estimates of these sizes in which the ball sizes weren't considered.

**Conclusions.** In work with the use of the data on a power serve in a jump received in the experiment offered by the author some characteristics of trajectories of a flight of a ball depending on values of kinematic variables are calculated. It is shown that the most essential dependence of a flying range of a ball to the chosen target, and, therefore, and the accuracy of the performance of a serve is observed from a departure angle $\theta$ and a ball speed $v_0$.

**Prospects of further researches.** For receiving more reliable and valid conclusions by results of the offered experiment it is necessary to investigate also other characteristics determining the accuracy of a power serve in a jump with the use of bigger volume of data on their performance. On the basis of such analysis is to develop the corresponding practical recommendations for the increase of accuracy of a serve.
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THE ESTIMATION OF AUTHOR PROGRAM’S EFFICIENCY OF PREPARATION UKRAINIAN ROWING WOMEN TEAM TO THE OLYMPIC GAMES – 2012

Abstract. Purpose: to give the estimation of efficiency of the use of the authorial training program in setup time for the women’s Ukraine rowing team representatives in the process of preparation to Olympic Games in London. Materials and Methods: 10 sportswomen of higher qualification, that are included to Ukraine rowing team, are participated in research. For the estimation of general and special physical preparedness the standard test and rowing ergometre Concept-2 are used. Results: the end of the preparatory period was observed significant improvement significant general and special physical fitness athletes surveyed, and their deviation from the model performance dropped to 5–7%. Conclusions: the high efficiency of the author training program for sportswomen of Ukrainian rowing team are testified and they became the Olympic champions in London. Keywords: general and special physical preparedness, rowing, women Ukrainian team, author training program, Olympic Games.

Introduction. It is conventional that training of sportsmen for the most important competitions provides the achievement of the highest level of their general, special, functional, technical and tactical and psychological preparedness, in particular to the Olympic Games [6; 7; 9; 11; 14].

The main attention has to be paid to their general and special preparation according to a number of experts, along with undoubted importance of all specified components of the general preparedness of sportsmen [3; 4; 5; 12].

At the same time the prompt growth of sports results among sportsmen of various countries specializing, in particular, in rowing provides a serious improvement of training programs taking into account the last achievements of sports science.

In this regard the development and the practical introduction in training process of sportsmen of the top skills of new programs of training classes at various stages of a year cycle of preparation, especially during the preparation for the most responsible competitions, is undoubtedly an actual problem which has a great practical value and is directed on the achievement of the maximum results by sportsmen [1; 2; 8; 13].

Communication of the research with scientific programs, plans, subjects. The work is a part of scientific programs of the faculty of physical training and the chair of the Olympic and professional sport and is executed within the subject.
"Studying of adaptive opportunities of an organism of sportsmen at different stages of the educational and training process" (the number of the state registration is 0106U000583) the Consolidating plan of RW of the Ministry of Education and Science of Ukraine for 2010–2014.

The objective of the research: to give an assessment to the efficiency of the use of the experimental program of training classes in the preparatory period for representatives of the women's national team of Ukraine on rowing in the course of preparation for the Olympic Games in London.

Material and methods of the research. We held the test of the general and special physical fitness of 10 sportswomen of the highest qualification, having training for the Olympic Games – 2012 in London in a line-up of the women's national team of Ukraine on rowing for the practical realization of the research objective. The testing of sportswomen was held at the beginning (October, 2011) and at the end (June, 2012) of the research, i.e. just before the Olympic starts.

During the whole preparatory period of the sportswomen of the national team of Ukraine were engaged according to the author's program of planning of training classes. The intensification of power-high-speed and power training of sportswomen and the stabilization of a rate of rowing at the level of model characteristics (42 strokes per minute) became the main accent of this program. The complete description of this program is presented by us in the methodical development for rowing coaches [10].

The level of the general physical fitness of sportswomen at all stages of the experiment was estimated on indicators of their general endurance (run on 3000 m, s), power endurance (number of times of raising of a bar, lying on a board, in 7 minutes) and maximum force by results of draft of a bar, lying on a board – the coefficient of the maximum force of Kmax, conventional units, c.u. was calculated).

A special rowing ergometer Concept-2 was used for an assessment of the level of the special physical fitness of sportswomen: loading power (N, W), heart rate (HR, bpm – 1) and lactate level in blood (L, mmol·l−1) were determined when passing distances of 125 m, 250 m, 500 m, 2000 m and 6000 m on an ergometer.

The model indicators of the general and special physical fitness of sportswomen of the highest qualification were used which are presented by us in the previous works for the purpose of the objective interpretation of data of the experiment in the research.

All received results during the research were processed on the personal computer with the use of a package of the program Statistika 6.0.

Results of the research and their discussion. The preliminary testing of the sportswomen of the national team of Ukraine was held at the beginning of the Olympic year, allowed to note that the examined sportswomen authentically conceded to model values of these parameters on indicators of the general and special physical fitness (tab. 1).

So, the sportswomen of the national team of Ukraine had authentically the worst, in comparison with model values, indicators of the general endurance (for 9,82±1,27%), power endurance (for 9,23±2,84%), maximum force (for 9,11±2,43%) at the beginning of the period of preparation.

Results of the preliminary testing of sportswomen on the ergometer Concept-2 showed that the deviation from the model characteristics at a distance of 125 m on the
capacity of the performed work, HR at loading and to a lactate in blood made respectively 16,08±1,47%; 9,36±4,39% and 9,54±9,05%; at a distance of 250 m – respectively 10,06±1,68%; 5,11±1,83% and 12,08±9,98%; at a distance of 500 m – 10,03±1,48%; 5,01±1,10%; 6,74±1,35%; at a distance of 2000 m – respectively 9,79±1,65%; 6,91±1,55% and 14,18±5,06% and for distances of 6000 m – respectively 9,46±1,86%; 6,30±3,79% and 30,36±7,27%.

Table 1

Indicators of the general and special physical fitness the sportswomen of a national team of Ukraine on rowing at the beginning of the forming experiment, X±S

<table>
<thead>
<tr>
<th>Indicators</th>
<th>National team of Ukraine (n=10)</th>
<th>Model characteristics (n=10)</th>
<th>% of deviations from model characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run on 3000 m, s</td>
<td>818,3±1,25</td>
<td>745,13±1,58***</td>
<td>9,82±1,27</td>
</tr>
<tr>
<td>Power endurance, q-ty of times</td>
<td>188,08±1,14</td>
<td>207,2±0,43***</td>
<td>–9,23±2,84</td>
</tr>
<tr>
<td>Kmax, s. u.</td>
<td>1,04±0,01</td>
<td>1,14±0,01***</td>
<td>–9,11±2,43</td>
</tr>
<tr>
<td>N-125, W</td>
<td>664,2±16,5</td>
<td>791,44±15,27***</td>
<td>–16,08±1,47</td>
</tr>
<tr>
<td>HR-125, bpm⁻¹</td>
<td>189,2±1,1</td>
<td>173±0,26***</td>
<td>9,36±4,39</td>
</tr>
<tr>
<td>Lactate-125, mmol·l⁻¹</td>
<td>7,68±0,07</td>
<td>8,49±0,01***</td>
<td>–9,54±9,05</td>
</tr>
<tr>
<td>N-250, W</td>
<td>582,2±19</td>
<td>647,29±14,02**</td>
<td>–10,06±1,68</td>
</tr>
<tr>
<td>HR –250, bpm⁻¹</td>
<td>199,7±0,91</td>
<td>190±0,59***</td>
<td>5,11±1,83</td>
</tr>
<tr>
<td>Lactate –250, mmol·l⁻¹</td>
<td>10,91±0,13</td>
<td>12,41±0,01***</td>
<td>–12,08±9,98</td>
</tr>
<tr>
<td>N-500, W</td>
<td>474±7,14</td>
<td>526,82±6,53***</td>
<td>–10,03±1,48</td>
</tr>
<tr>
<td>HR –500, bpm⁻¹</td>
<td>201,2±1</td>
<td>191,6±2,21***</td>
<td>5,01±1,10</td>
</tr>
<tr>
<td>Lactate –500, mmol·l⁻¹</td>
<td>14,73±0,08</td>
<td>13,8±0,09***</td>
<td>6,74±1,35</td>
</tr>
<tr>
<td>N-2000, W</td>
<td>328,9±6,85</td>
<td>364,58±5,21***</td>
<td>–9,79±1,65</td>
</tr>
<tr>
<td>HR 2000, bpm⁻¹</td>
<td>194,3±0,67</td>
<td>181,73±0,56***</td>
<td>6,91±1,55</td>
</tr>
<tr>
<td>Lactate –2000, mmol·l⁻¹</td>
<td>16±0,25</td>
<td>14,01±0,05***</td>
<td>14,18±5,06</td>
</tr>
<tr>
<td>N-6000, W</td>
<td>259,3±6,55</td>
<td>286,4±4,18***</td>
<td>–9,46±1,86</td>
</tr>
<tr>
<td>HR –6000, bpm⁻¹</td>
<td>186,1±1,04</td>
<td>175,07±0,28***</td>
<td>6,30±3,79</td>
</tr>
<tr>
<td>Lactate –6000, mmol·l⁻¹</td>
<td>10,49±0,43</td>
<td>8,05±0,06**</td>
<td>30,36±7,27</td>
</tr>
</tbody>
</table>

Note. ** – p <0,01; *** – p <0,001 in comparison with indicators of the women's national team of Ukraine on rowing.

In general the sizes of deviations of indicators of the general and physical fitness of the sportswomen of the national team of Ukraine from model characteristics fluctuated in the range from 5% to 16% at the beginning of the period of preparation for the Olympic Games that, according to experts, is admissible for this stage of a year cycle of preparation. Rather high sizes of deviations in values of a lactate after passing by sportswomen of distances of 2000 m and 6000 m on a rowing ergometer which were significantly higher than the model characteristics (respectively 30,36±7,27% and 14,18±5,06%) guarded a little. In this regard the special attention was paid to the increase of the general endurance of the sportswomen of the national team of Ukraine and to the increase in aerobic capacity of their organism as the distance of 2000 m is a "working" competitive distance.

We carried out the corresponding correction of the comprehensive program of preparation of the women's national team of Ukraine for the Olympic Games in
London taking into account the results of the examination of sportswomen in the Pre-
Olympic year (2011), and also the presented data of the preliminary testing in the
Olympic year (2012). The assessment of the efficiency of this program and the
degree of preparedness of sportswomen of the national team of Ukraine to the
Olympic Games-2012 in London was carried out by us on the basis of the results of
their final testing in June, 2012.

The reliable improvement of the majority of the indicators of the general and
special physical fitness used in the research was characteristic apparently fr
om the
results presented in tab. 2 to the end of the preparatory period for sportswomen of the
national team of Ukraine.

So, the run time on 300 m decreased till 757,75±1,15 s or on −7,40±1,36%,
indicators in tests on power endurance and maximum force improved on 8,70±1,48%
to 204,44±1,24 times) and on 8,18% (till 1,12±0,03%).

Undoubtedly, the changes of the indicators were positive which are registered
in the tests with the use of the rowing exercise machine. It should be noted that,
irrespectively from a distance (from 125 m to 6000 m), the orientation of these
changes was almost identical: the decrease in heart rate (on 4–7%), the lactate in
blood (on 9–22%) and, on the contrary, the increase in power of the performed work
(on 9–17%).

The special attention was paid by us on the results of the ergometric testing of
sportswomen of the national team of Ukraine at a distance of 2000 m. It is established
that undoubtedly positive changes were characteristic to end of the preparatory period
for them, in comparison with the beginning of the period of preparation which were
expressed in the reliable decrease in HR to 185,10±0,78 bpm or on 4,73±1,54%,
lactate level in blood to 14,10±0,22 mmol · l⁻¹ or on 11,88±1,34% and the increase of
power of work to 361,4±7,92 W or on 9,88±1,53%.

Table 2

<table>
<thead>
<tr>
<th>Indicators</th>
<th>The beginning of the research</th>
<th>The end of the research</th>
<th>% of changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run on 3000 m, s</td>
<td>818,3±1,25</td>
<td>757,75±1,15***</td>
<td>−7,40±1,36</td>
</tr>
<tr>
<td>Power endurance, q-ty of times</td>
<td>188,08±1,14</td>
<td>204,44±1,24***</td>
<td>8,70±1,48</td>
</tr>
<tr>
<td>Kmax, s. u.</td>
<td>1,04±0,01</td>
<td>1,12±0,03*</td>
<td>8,18±4,26</td>
</tr>
<tr>
<td>N-125, W</td>
<td>664,2±16,5</td>
<td>778,9±15,8***</td>
<td>17,27±1,38</td>
</tr>
<tr>
<td>HR –125, bpm⁻¹</td>
<td>189,2±1,1</td>
<td>176,9±1,04***</td>
<td>−6,50±1,37</td>
</tr>
<tr>
<td>Lactate –125, mmol·l⁻¹</td>
<td>7,68±0,07</td>
<td>8,38±0,16***</td>
<td>9,11±2,64</td>
</tr>
<tr>
<td>N-250, W</td>
<td>582,2±19</td>
<td>638,4±19,23</td>
<td>9,65±1,42</td>
</tr>
<tr>
<td>HR –250, bpm⁻¹</td>
<td>199,7±0,91</td>
<td>192,5±0,83***</td>
<td>−3,61±1,36</td>
</tr>
<tr>
<td>Lactate –250, mmol·l⁻¹</td>
<td>10,91±0,13</td>
<td>12,19±0,14***</td>
<td>11,73±1,44</td>
</tr>
<tr>
<td>N-500, W</td>
<td>474±7,14</td>
<td>515,11±7,38***</td>
<td>8,67±1,44</td>
</tr>
<tr>
<td>HR –500, bpm⁻¹</td>
<td>201,2±1</td>
<td>194,5±1***</td>
<td>−3,33±1,42</td>
</tr>
<tr>
<td>Lactate –500, mmol·l⁻¹</td>
<td>14,73±0,08</td>
<td>14,01±0,12***</td>
<td>−4,89±1,76</td>
</tr>
<tr>
<td>N-2000, W</td>
<td>328,9±6,85</td>
<td>361,4±7,92**</td>
<td>9,88±1,53</td>
</tr>
<tr>
<td>HR –2000, bpm⁻¹</td>
<td>194,3±0,67</td>
<td>185,1±0,78***</td>
<td>−4,73±1,54</td>
</tr>
</tbody>
</table>
The positive dynamics of indicators of the general and special physical fitness of sportswomen of the national team of Ukraine and results of the comparative analysis with model values of these indicators were confirmed (tab. 3).

It was succeeded to establish that sportswomen of the national team of Ukraine on rowing practically "came nearer" to the model characteristics to the end of the period of preparation for the Olympic Games – 2012 in London.

**Table 3**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>National team of Ukraine (n=10)</th>
<th>Model characteristics (n=10)</th>
<th>% of deviations from model characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run on 3000 m, s</td>
<td>$757,75\pm1,15$</td>
<td>$745,13\pm1,58^{***}$</td>
<td>$1,69\pm1,36$</td>
</tr>
<tr>
<td>Power endurance, q-ty of times</td>
<td>$204,44\pm1,24$</td>
<td>$207,2\pm0,43^*$</td>
<td>$1,33\pm1,48$</td>
</tr>
<tr>
<td>Kmax, s. u.</td>
<td>$1,12\pm0,03$</td>
<td>$1,14\pm0,02$</td>
<td>$1,68\pm4,26$</td>
</tr>
<tr>
<td>N-125, W</td>
<td>$778,9\pm15,8$</td>
<td>$791,44\pm15,27$</td>
<td>$1,58\pm1,38$</td>
</tr>
<tr>
<td>HR-125, bpm$^-1$</td>
<td>$176,9\pm1,04$</td>
<td>$173,0\pm0,26^{**}$</td>
<td>$2,25\pm1,37$</td>
</tr>
<tr>
<td>Lactate-125, mmol$^-1$</td>
<td>$8,38\pm0,16$</td>
<td>$8,49\pm0,01$</td>
<td>$1,3\pm2,64$</td>
</tr>
<tr>
<td>N-250, W</td>
<td>$638,4\pm19,23$</td>
<td>$647,29\pm14,02$</td>
<td>$1,37\pm1,42$</td>
</tr>
<tr>
<td>HR-250, bpm$^-1$</td>
<td>$192,5\pm0,83$</td>
<td>$190\pm0,59^*$</td>
<td>$1,32\pm1,36$</td>
</tr>
<tr>
<td>Lactate-250, mmol$^-1$</td>
<td>$12,19\pm0,14$</td>
<td>$12,41\pm0,01$</td>
<td>$1,77\pm1,44$</td>
</tr>
<tr>
<td>N-500, W</td>
<td>$515,11\pm7,38$</td>
<td>$526,82\pm6,53$</td>
<td>$2,22\pm1,44$</td>
</tr>
<tr>
<td>HR-500, bpm$^-1$</td>
<td>$194,5\pm1$</td>
<td>$191,6\pm2,21$</td>
<td>$1,51\pm1,42$</td>
</tr>
<tr>
<td>Lactate-500, mmol$^-1$</td>
<td>$14,01\pm0,12$</td>
<td>$13,8\pm0,09$</td>
<td>$1,52\pm1,76$</td>
</tr>
<tr>
<td>N-2000, W</td>
<td>$361,4\pm7,92$</td>
<td>$364,58\pm5,21$</td>
<td>$0,87\pm1,53$</td>
</tr>
<tr>
<td>HR2000, bpm$^-1$</td>
<td>$185,1\pm0,78$</td>
<td>$181,73\pm0,56^{**}$</td>
<td>$1,85\pm1,54$</td>
</tr>
<tr>
<td>Lactate-2000, mmol$^-1$</td>
<td>$14,1\pm0,22$</td>
<td>$14,01\pm0,05$</td>
<td>$0,62\pm1,34$</td>
</tr>
<tr>
<td>N-6000, W</td>
<td>$285,5\pm7,71$</td>
<td>$286,4\pm4,18$</td>
<td>$0,32\pm1,54$</td>
</tr>
<tr>
<td>HR-6000, bpm$^-1$</td>
<td>$177,7\pm0,79$</td>
<td>$175,07\pm0,28^{*}$</td>
<td>$1,50\pm1,26$</td>
</tr>
<tr>
<td>Lactate-6000, mmol$^-1$</td>
<td>$8,17\pm0,25$</td>
<td>$8,05\pm0,06$</td>
<td>$1,53\pm1,16$</td>
</tr>
</tbody>
</table>

**Note.** * – $p <0,05$; ** – $p <0,01$; *** – $p <0,001$ in comparison with indicators of the women's national team of Ukraine on rowing.

Distinctions were reliable only on the level of the general and power endurance and sizes of HR when passing all distances (from 125 m to 6000 m) on a rowing ergometer. However these differences were extremely insignificant and fluctuated in the range of 1,32–2,25%.
Moreover, on all other indicators of the general and special physical fitness of a sportswoman of the national team of Ukraine authentically didn't differ from the model characteristics.

The obtained data testified not only to a high efficiency of the author's program of preparation of the women's national team on rowing for the Olympic Games, but also to a high degree of their preparedness to these main international competitions.

The results of sportswomen of the national team of Ukraine on control starts (the 3rd stage of the World Cup in Munich, 15.06.12–17.06.12) where our sportswomen won a convincing victory with results 6.19.40 in the preliminary race and 6.33.10 in the final became the convincing confirmation to it.

Conclusions:

1. The results of the made experiment testified to the high efficiency of the author's program of training of the representatives of the national team of Ukraine on rowing for the Olympic Games – 2012, the general and special preparedness of sportswomen which provided the achievement of the high level before the main competitions of a four-year cycle of preparation.

2. In our opinion, the high level of the general preparedness of sportswomen of the national team of Ukraine was reached at the expense of the increase in volume of training classes at their high-speed power and power preparation, and also due to the achievement and the maintenance by sportswomen, during passing of a distance, optimum rate of rowing (42 strokes per minute).

Their gold medals at the Olympic Games – 2012 in London with result 6.34.01 in the final race became the confirmation of the high efficiency of preparation sportswomen of the national team of Ukraine by the program offered by us.

Prospects of further researches in this direction. Studying of the efficiency of the use of the author's program of planning of training classes for sportswomen of the highest qualification in the increase of the level of their functional preparedness is planned further.

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THE ASSESSMENT OF SOME PARAMETERS OF PHYSICAL HEALTH OF PRIMARY SCHOOL PUPILS

Abstract. Purpose: to determine the level of somatic health and adaptive-reserve capabilities of organism of primary school pupils. Material and Methods: physical health level was determined by the means of H. L. Apanasenko method. The methodology developed by S. V. Hosak and O. T. Elizarova was used for estimation the level of pupils’ adaptation to environment. The study involved 55 pupils 6–7 years (27 boys and 28 girls) enrolled in 1-A and 1-B forms of comprehensive school № 7, Shostka, Sumy region. Results: it was determined that characteristics of physical health of most pupils of primary school conform to levels from low to medium, and most pupils have medium level of adaptive capabilities. Conclusions: there is an urgent necessity in organization and conduct of purposeful sports and preventive measures that contribute to improving health and adaptive-reserve capabilities of the organism in junior school.

Keywords: pupils, primary school, level of physical health.

Introduction. Modern scientific researches testify to the considerable deterioration of a state of health of the population of Ukraine for the last decade. The growth rate of sickness among children and youth is the highest, in comparison with other age groups. So, about 90% of children have a deviation in a state of health, over than 59% – unsatisfactory physical fitness according to MHC of Ukraine. In recent years the sickness of children increased by 25,4%, and teenagers – on 23,7% [6].

Together with such factors as genetic tendency, adverse social and ecological conditions, essential influence on health of pupils have factors that which are directly connected with the studying process at school. Experts connect till 40% of children’s and youthful pathologies exactly with a negative action of these factors to which the intensification and the irrational organization of the educational process belong, the discrepancy of techniques of study to century and psychological features of pupils and etc. [1].

According to experts, one of the main factors which negatively influence a state of health of children is a deficiency of physical activity which is observed already at a young school age [4]. Foreign experts call a physical divergence the leading risk factor of the development of diseases [11].

As the statistics testifies, the level of physical activity sharply decreases when a child goes from a kindergarten to a school, as a result – the state of health of the child worsens [1]. Specialists of the World Health Organization note the need to devote to physical activity of children at least 60 minutes per day. According to scientists, it
will promote the preservation of health, will allow adapting quicker in the society, and will develop strong-willed qualities of a child [9].

Studying of a state of health of children and youth in the interrelation with physical training is extremely important for the justification of prophylactic- health-improving actions, the definition of the content of classes on physical exercises, for strengthening of health of a growing up generation [4].

Therefore the researches are relevant during of which there will be a certain level of physical health and adaptation and reserve opportunities of organisms of pupils of the first classes of the comprehensive school.

Communication of the research with scientific programs, plans, subjects.
This work is included into the direction of the research of the chair of TMPC of educational- scientific IPC of Sumy A.S. Makarenko state pedagogical university – "The increase of the level of health and physical fitness of different groups of the population by means of physical culture", Institute of scientific- technical and economic information in Kyiv approved by the department of the state registration of Ukraine, the number of the state registration is 0111U005736.

The aim of the research: to estimate the level of physical health and adaptation- reserve opportunities of organisms of pupils of the first classes of the comprehensive school.

Research tasks:
1. To carry out a complex assessment of physical health, having defined Robinson's index, results of functional tests, a tone of activity of muscular tissue and compliance of a body weight of pupils to body length.
2. To find out a degree of the adaptability of organisms of pupils for conditions of the environment and the efficiency of the educational process at school.
3. To find the interrelation level between the level of somatic health and the level of adaptation- reserve opportunities of organisms of pupils.

Material and methods of the research. The object of the research became indicators of physical health of 55 pupils of the first classes of the comprehensive school No. 7 in Shostka of the Sumy area (28 girls and 27 boys). The technique of G. L. Apanasenko was used for the purpose of the determination of the level of physical health [1]. The technique of S. V. Gozak and O. T. Yelizarova was used for an assessment of adaptation- reserve opportunities of organisms of pupils used [2].

The choice of techniques is caused by their availability to the practical use and the sufficient informational content to forecasting of the sickness of children which gives the chance to carry out preventively improving actions in the system of physical training.

Results of the research and their discussion. Indicators of a body length and a body weight of pupils, thorax volume at rest of the vital capacity of lungs, heart rate, systolic and diastolic arterial pressure, dynamometry of the strongest hand, a breath delay time on a breath and an exhalation were estimated during the research.

It is known that an important indicator of physical development of the child is proportionality of the sizes of a body [7]. The percentile method of an assessment showed to thorax perimeter depending on a growth that 70,4% of boys and 39,3% of girls have harmonious physical development. Other first-graders have not respectively thorax perimeter to a body length. So, high rates of a thorax perimeter have 3,6% of girls and 11,1% of boys. Above the average values have 14,4% of girls
and 3,7% of boys, 17,8% of girls and 7,4% of boys got to the area of sizes below the average. Low indicators of volume of a thorax depending on a body length have 7,4% of boys and 17,8% of girls. Very high rates of volume of a thorax have 7,1% of girls, somatoscopy testifies to the existence of an obesity at these girls.

By means of the percentile method of an assessment to thorax perimeter depending on the growth it was established that the percent of boys who have a harmonious constitution, is much more, than percent of girls is. In our opinion, it is connected with that girls, since the younger school age feel much more deficiency of physical activity, than boys do.

It is established that in most of first-graders indicators of heart rate (by V. K. Tatochenko, 1997) are in limits of the age norm (57,1% of girls and 55,5% of boys), slight bradycardia is found in 7,1% of girls and 18,5% of boys, moderate bradycardia, – in 3,7% of girls and 11,1% of children. Slight tachycardia is found in 25% of girls and 11,1% of boys, moderate tachycardia, – in 3,7% of boys, considerable tachycardia, – in 7,1% of girls [3].

Indicators of the vital capacity of lungs estimated in the ratio with the standard values calculated for each pupil by a formula of Ludovic (V. S. Yazlovetsky, 1991). The value of the vital capacity of lungs of most of pupils (63,4% of girls and 88,9% of boys) is exceeded by standard indicators that points to a high functional condition of lungs. At the same time the value of the vital capacity of lungs norms are lower in 35,7% of girls and 11,1% of boys [4].

The received average indexes of Shtange’s and Genchi tests are also lower than norm, both at boys, and at girls, in norm [4] the duration of a delay of breath on a breath at children of 7-11 years old makes 30–35 s, on an exhalation – 20–39s.

The reliability of differences of average sizes of indicators of groups of boys and girls was defined by calculation of Student criteria (t). At the set reliability of $P=0,95$, $t_{gr.} = 2,064$. Having analyzed data, we defined that the majority of indicators of a physical condition of children of 6-7 years old have no reliable statistical differences depending on a sex. The exception is made only indicators of heart rate and vital capacity of lungs (HR is lower at boys, than at girls, and the vital capacity of lungs is bigger) (tab. 1).

<table>
<thead>
<tr>
<th>№</th>
<th>Category</th>
<th>Boys</th>
<th>Girls</th>
<th>t</th>
<th>$t_{gr.}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body length, sm</td>
<td>120,9</td>
<td>122,75</td>
<td>1,244</td>
<td>2,064</td>
</tr>
<tr>
<td>2</td>
<td>Body weight, kg</td>
<td>23,1</td>
<td>23,5</td>
<td>0,432</td>
<td>2,064</td>
</tr>
<tr>
<td>3</td>
<td>Size of thorax, sm</td>
<td>59,2</td>
<td>58,5</td>
<td>0,729</td>
<td>2,064</td>
</tr>
<tr>
<td>4</td>
<td>Heart rate, bpm$^{-1}$</td>
<td>88</td>
<td>92</td>
<td>2,135</td>
<td>2,064</td>
</tr>
<tr>
<td>5</td>
<td>Blood pressure systolic, mm mer.col.</td>
<td>90</td>
<td>87</td>
<td>1,632</td>
<td>2,064</td>
</tr>
<tr>
<td>6</td>
<td>Blood pressure diastolic, mm mer.col.</td>
<td>57</td>
<td>57</td>
<td>0</td>
<td>2,064</td>
</tr>
<tr>
<td>7</td>
<td>Vital capacity of lungs, ml</td>
<td>1399</td>
<td>1377</td>
<td>2,471</td>
<td>2,064</td>
</tr>
<tr>
<td>8</td>
<td>Dynamometry of the strongest hand, kg</td>
<td>13,7</td>
<td>12,6</td>
<td>0,817</td>
<td>2,064</td>
</tr>
<tr>
<td>9</td>
<td>Shtange’s test, s</td>
<td>20,8</td>
<td>21,4</td>
<td>0,404</td>
<td>2,064</td>
</tr>
<tr>
<td>10</td>
<td>Genchi’s test, s</td>
<td>12,9</td>
<td>14,5</td>
<td>1,230</td>
<td>2,064</td>
</tr>
</tbody>
</table>
Five indicators were defined during the complex estimation of physical health: indexes of Ruffier and Robinson, vital and power indexes, compliance of a body weight to a body length. The research showed that first-graders have the best indicators in a power index. But the worst results were shown by pupils in Ruffier test, both boys, and girls. These data testify that the vast majority of pupils of the first class have a below the average level and a low level of physical working capacity. Therefore, there is an urgent need of the organization and carrying out with them the directed sports and preventive actions.

The percentage ratio of pupils by the level of functional indicators is defined as a result of the analysis of the obtained data (tab. 2).

Table 2

<table>
<thead>
<tr>
<th>№</th>
<th>Level</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>VI</td>
<td>PI</td>
</tr>
<tr>
<td>1</td>
<td>High</td>
<td>7,4</td>
<td>44,4</td>
</tr>
<tr>
<td>2</td>
<td>Above the average</td>
<td>18,5</td>
<td>7,4</td>
</tr>
<tr>
<td>3</td>
<td>Average</td>
<td>48,2</td>
<td>7,4</td>
</tr>
<tr>
<td>4</td>
<td>Below the average</td>
<td>14,8</td>
<td>14,9</td>
</tr>
<tr>
<td>5</td>
<td>Low</td>
<td>11,1</td>
<td>25,9</td>
</tr>
</tbody>
</table>

*Note.* VI – vital index, PI – power index

During the research it was found out that most of pupils have low, below the average and average level of physical health. So, only 3,6% of girls and 11,1% of boys have above the average level of health. The average level of health is established in 57,1% of girls and 37% of boys, below the average – in 17,9% of girls and 33,3% of boys. The low level of health is found in 21,4% of girls and 18,6% of boys. Pupils with the high level of health aren't found among first-graders.

As the vast majority of first-graders (96,4% of girls and 88,9% of boys) got to the group of risk according to the estimation of the level of somatic health, we conducted additional researches, which defined the degree of the adaptability of children for conditions of the environment.

It is established that 100% of girls and 92,6% of boys who study in the first class, feel tension of mechanisms of adaptation. So, only 7,4% of boys have the high level of adaptation- reserve opportunities of organisms, 85,7% of girls and 70,4% of boys have the average level. Critically the low level of adaptation is established in 14,3% of girls and 22,2% of boys.

The strong correlation dependence between the level of adaptation-reserve opportunities of organisms and the level of somatic health of first-graders is established. So, the indicator of correlation makes $r=0,60$ at boys, girls have $r=0,69$. 

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Conclusions. The accounting of the level of physical development, somatic health and nature of adaptation to the environment conditions, gives the chance more to individualize the process of physical training of children of the school age.

The confirmed data of a number of authors are that a state of somatic health of most of first-graders is below the "safe" level during the research. It is established that the vast majority of pupils of the first classes got to the group of risk of rather possible failure of adaptation which will lead to even bigger deterioration of a state of health. Therefore, there is an urgent need of the organization and carrying out with them the directed sports and preventive actions which will promote the increase of the level of health and adaptation- reserve opportunities of an organism.

Prospects of the subsequent researches. In the subsequent the influence of the developed by us technology of the use of means of yoga-aerobics in physical training of pupils of the first classes of the comprehensive school [5] will be experimentally checked for the level of indicators of physical development, physical health and physical fitness.

References:
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FEATURES OF MORPHOLOGICAL AND FUNCTIONAL CHARACTERISTICS OF YOUNG SWIMMERS 14–18 YEARS

Abstract. Purpose: to develop the model of morphofunctional characteristics of the strongest young swimmers aged 14–18 years. Material and Methods: the anthropometric and functional measurements, questionnaires, testing of 60 swimmers aged 14–18 years, methods of mathematical statistics. Results: the characteristic features of the model of morphological and functional performance of young swimmers of different age groups were identified. Conclusions: taking the obtained results allow to determine the suitability of the sport and the prospects of young swimmers with higher probability, according to their age and stage of long-term preparation.

Keywords: athletes, young swimmers, models, morphological and functional characteristics.

Introduction. The modern practice of sports swimming, and also various scientific researches specify that the world-class results are available to only especially gifted sportsmen having pronounced inborn advances to achievements at the certain competitive distances [5; 7; 8; 10].

It is known that indicators of a constitution play an essential role in the achievement of success in sports swimming [1; 3; 4; 5; 9]. The total sizes of a body and a proportion significantly influence the physical working capacity, the sports activity, a choice of sports specialization and have a high hereditary conditionality which, along with psychological, physiological, biochemical factors, give the chance to define prospects of sportsmen [1; 2; 3; 8]. A big body length and weight, a bigger ratio of length of a trunk and extremities give the chance for a sportsman to gather a high speed on a starting site of a distance, to carry out movements with bigger amplitude and power of fungal movements [1; 4]. In turn swimmers have to correspond to a morphological model of the strongest sportsmen on their overall, biomechanical and hydrodynamic features.

As a result of long-term researches the generalized model of morphofunctional characteristics were developed and standard requirements are developed to the level of physical development of swimmers, as a rule, of a high-class [1; 6; 9]. The usage of such models has restrictions in practice of youthful sport as during the various age periods of requirements imposed to these or those systems of an organism differ enough.

It should be noted that the intermediate model characteristics of young sportsmen developed earlier in the 70-80th years of the XX century became outdated.
a little today. In this regard there is a need for an addition of scientific knowledge of features of morphofunctional indicators of young swimmers of 14-18 years old according to current trends of the development of sports swimming. In turn the development of intermediate group models of swimmers will allow increasing the efficiency of selection of the most perspective sportsmen at certain stages of long-term training.

Communication of the research with scientific programs, plans, subjects. The work was performed within the Consolidating plan of RW in the sphere of physical culture and sport of Ukraine for 2011-2015 on a subject 2.13 "Modeling of technical and tactical actions of the qualified sportsmen in swimming and high-speed and power disciplines of track and field athletics" (No. of the state registration is 0111U000191).

The objective of the research: the development of group model characteristics of morphofunctional indicators of young swimmers at the age of 14–18 years old.

Material and methods of the research: analysis of scientific and methodical literature, anthropometrical and functional measurements, questioning, pedagogical testing, methods of mathematical statistics.

The data collection was carried out during the educational training camps which were organized by Federation of swimming of Ukraine, within the work of CNG. The surveyed contingent consisted of the strongest young swimmers boys of 14-18 years old (n=60) included in the main, reserve and youth structures of a national team of Ukraine. The level of their sports qualification corresponded to a rank of MSIC, MS and CMS, the I category in swimming.

So, at the time of inspection of sportsmen in the age group of 14 years old (n=10) the I sports category had 60%, and CMS – 40%. Among the 15-year-old swimmers (n=20) the I category was executed by 25% of sportsmen, CMS – 70%, and the status of MS – 5%. In the age group of 16-year old (n=27) only 3,7% of swimmers had the I category. The majority of them executed the standard of CMS – 59,3% and the status of MS – 37%. Other situation is observed among swimmers at the age of 17–18 years old (n=13) where 76,9% had the status of MS, and MSIC – 23,1%.

Longitudinal and girth sizes of a body, body weight, VCL, excursion of a thorax were studied for the purpose of the development of model characteristics of swimmers. The assessment of physical development of sportsmen was received by means of calculation of indexes (a ratio of the anthropometrical indicators) characterizing proportions of a body and features of a constitution and also defined some indicators of physical fitness (a mobility in shoulder joints, an inclination forward, a high jump and length from a place). In total 44 parameters were studied.

Results of researches and their discussion. Standards (models) were created on the basis of the measurements of the uniform age group of swimmers and the calculation of an average size of a sign (tab).
## Morphofunctional parameters of sportsmen-swimmers of 14-18 years old

<table>
<thead>
<tr>
<th>№</th>
<th>Morphofunctional parameters</th>
<th>14 years old (n=10)</th>
<th>15 years old (n=20)</th>
<th>16 years old (n=27)</th>
<th>17–18 years old (n=13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body length, sm</td>
<td>175,0±6,04</td>
<td>181,18±6,30</td>
<td>183,76±5,72</td>
<td>185,54±6,17</td>
</tr>
<tr>
<td>2</td>
<td>Body weight, kg</td>
<td>61,79±5,45</td>
<td>66,08±7,60</td>
<td>73,62±5,52</td>
<td>76,35±6,00</td>
</tr>
<tr>
<td>3</td>
<td>VCL, l</td>
<td>5,06±0,73</td>
<td>5,62±0,76</td>
<td>5,88±0,74</td>
<td>5,89±0,72</td>
</tr>
<tr>
<td>4</td>
<td>Length of an arm, sm</td>
<td>78,45±2,95</td>
<td>81,95±3,17</td>
<td>82,41±2,74</td>
<td>83,58±2,72</td>
</tr>
<tr>
<td>5</td>
<td>Sweep of hands, sm</td>
<td>178,15±5,17</td>
<td>187,05±7,83</td>
<td>188,65±5,68</td>
<td>190,19±3,36</td>
</tr>
<tr>
<td>6</td>
<td>Length of a hand, sm</td>
<td>20,4±1,05</td>
<td>20,93±1,13</td>
<td>21,19±0,92</td>
<td>20,82±1,61</td>
</tr>
<tr>
<td>7</td>
<td>Length of a forearm, sm</td>
<td>24,55±1,40</td>
<td>26,45±1,93</td>
<td>25,87±1,37</td>
<td>26,85±1,92</td>
</tr>
<tr>
<td>8</td>
<td>Length of a shoulder</td>
<td>31,1±1,54</td>
<td>33,33±1,36</td>
<td>33,31±2,59</td>
<td>34,77±2,10</td>
</tr>
<tr>
<td>9</td>
<td>Length of a leg, sm</td>
<td>88,5±4,31</td>
<td>90,30±3,63</td>
<td>94,15±4,29</td>
<td>96,07±5,24</td>
</tr>
<tr>
<td>10</td>
<td>Length of a hip, sm</td>
<td>43,0±2,00</td>
<td>44,50±1,74</td>
<td>45,10±2,64</td>
<td>44,85±2,49</td>
</tr>
<tr>
<td>11</td>
<td>Length of a shin, sm</td>
<td>41,2±2,21</td>
<td>42,93±2,18</td>
<td>43,09±2,85</td>
<td>44,38±2,69</td>
</tr>
<tr>
<td>12</td>
<td>Length of a foot, sm</td>
<td>27,1±1,17</td>
<td>27,53±1,38</td>
<td>28,13±1,09</td>
<td>27,83±1,29</td>
</tr>
<tr>
<td>13</td>
<td>Length of a trunk, sm</td>
<td>57,05±3,69</td>
<td>59,65±4,07</td>
<td>60,15±3,66</td>
<td>61,65±2,49</td>
</tr>
<tr>
<td>14</td>
<td>Width of shoulders, sm</td>
<td>38,7±1,42</td>
<td>39,93±1,98</td>
<td>41,26±1,81</td>
<td>43,27±2,71</td>
</tr>
<tr>
<td>15</td>
<td>Width of a pelvis, sm</td>
<td>26,25±1,93</td>
<td>27,13±1,43</td>
<td>27,96±1,68</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Width of a hand, sm</td>
<td>9,0±0,47</td>
<td>9,20±0,47</td>
<td>9,26±0,32</td>
<td>9,58±1,26</td>
</tr>
<tr>
<td>17</td>
<td>Girth of a thorax at rest, sm</td>
<td>90,8±4,08</td>
<td>93,28±4,79</td>
<td>96,74±3,77</td>
<td>97,69±2,72</td>
</tr>
<tr>
<td>18</td>
<td>Girth of a thorax on a breath, sm</td>
<td>97,4±4,38</td>
<td>99,75±4,08</td>
<td>103,15±3,86</td>
<td>103,69±2,88</td>
</tr>
<tr>
<td>19</td>
<td>Girth of a thorax on an exhalation, sm</td>
<td>86,8±4,18</td>
<td>89,03±4,32</td>
<td>93,07±3,86</td>
<td>93,50±2,81</td>
</tr>
<tr>
<td>20</td>
<td>Girth of a shoulder (intens.), sm</td>
<td>29,55±1,85</td>
<td>30,60±2,09</td>
<td>32,96±1,95</td>
<td>33,73±2,61</td>
</tr>
<tr>
<td>21</td>
<td>Girth of a shoulder (weakened), sm</td>
<td>26,9±1,24</td>
<td>27,55±2,27</td>
<td>29,93±1,81</td>
<td>30,73±2,17</td>
</tr>
<tr>
<td>22</td>
<td>Girth of a forearm, sm</td>
<td>24,45±1,72</td>
<td>24,68±1,70</td>
<td>26,17±1,46</td>
<td>26,81±1,25</td>
</tr>
<tr>
<td>23</td>
<td>Girth of a wrist, sm</td>
<td>16,25±0,98</td>
<td>16,25±0,72</td>
<td>17,06±0,80</td>
<td>17,31±1,15</td>
</tr>
<tr>
<td>24</td>
<td>Girth of a waist, sm</td>
<td>70,8±2,90</td>
<td>72,18±4,43</td>
<td>75,07±2,88</td>
<td>79,15±4,14</td>
</tr>
<tr>
<td>25</td>
<td>Girth of butocks, sm</td>
<td>88,15±4,01</td>
<td>90,20±5,16</td>
<td>93,48±3,61</td>
<td>95,92±3,71</td>
</tr>
<tr>
<td>26</td>
<td>Girth of a hip, sm</td>
<td>48,0±2,20</td>
<td>49,25±3,73</td>
<td>51,80±3,21</td>
<td>53,19±2,68</td>
</tr>
<tr>
<td>27</td>
<td>Girth of a knee, sm</td>
<td>35,55±1,69</td>
<td>35,68±1,73</td>
<td>36,67±1,41</td>
<td>36,85±1,86</td>
</tr>
<tr>
<td>28</td>
<td>Girth of a calf, sm</td>
<td>35,15±2,01</td>
<td>34,38±2,11</td>
<td>36,24±1,83</td>
<td>35,73±3,76</td>
</tr>
<tr>
<td>29</td>
<td>Girth of an anklebone, sm</td>
<td>22,65±1,16</td>
<td>22,13±1,71</td>
<td>23,04±1,20</td>
<td>23,23±1,32</td>
</tr>
<tr>
<td>30</td>
<td>Length of an arm/Length of a body, s.u.</td>
<td>0,45±0,01</td>
<td>0,45±0,01</td>
<td>0,45±0,01</td>
<td>0,45±0,01</td>
</tr>
<tr>
<td>31</td>
<td>Length of a leg/Length of a body, s.u.</td>
<td>0,49±0,01</td>
<td>0,50±0,01</td>
<td>0,50±0,01</td>
<td>0,50±0,02</td>
</tr>
<tr>
<td>32</td>
<td>Width of shoulders/Length of a body, s.u.</td>
<td>0,22±0,01</td>
<td>0,22±0,01</td>
<td>0,22±0,01</td>
<td>0,23±0,01</td>
</tr>
<tr>
<td>33</td>
<td>Girth of thorax / Length of a body, s.u.</td>
<td>0,52±0,03</td>
<td>0,51±0,02</td>
<td>0,53±0,02</td>
<td>0,53±0,03</td>
</tr>
<tr>
<td>34</td>
<td>Index Quetelet, g·sm⁻¹</td>
<td>352,93±26,68</td>
<td>364,18±34,19</td>
<td>400,49±24,76</td>
<td>411,35±27,57</td>
</tr>
<tr>
<td>35</td>
<td>VCL, m·kg⁻¹</td>
<td>81,87±9,33</td>
<td>85,03±7,79</td>
<td>80,27±9,64</td>
<td>76,64±8,48</td>
</tr>
<tr>
<td>36</td>
<td>Excursion of a thorax, sm</td>
<td>10,60±2,94</td>
<td>10,73±1,26</td>
<td>10,08±1,82</td>
<td>10,19±1,98</td>
</tr>
<tr>
<td>37</td>
<td>Width of shoulders/Width</td>
<td>1,48±0,10</td>
<td>1,53±0,11</td>
<td>1,52±0,10</td>
<td>1,55±0,12</td>
</tr>
</tbody>
</table>
It is known that high indicators of the total sizes allow sportsmen—swimmers to perform their work of a high-speed and power orientation in an anaerobic zone of the power supply successfully. The important characteristic of the intensity of the process of the growth are body length and body weight. Length of a body positively affects, the increase of which on 10 sm reduces the water resistance on 5% on hydrodynamic qualities [1; 4].

So, when comparing the main total sizes of a body of swimmers of 14-18 years old it is revealed that the greatest values of length of a body are recorded at sportsmen of 17-18 years old (185,54±6,17 sm), and the smallest one at sportsmen of 14 years old (175,0±6,04 sm). Thus authentically the significant distinctions on a body length indicator are noted between groups of swimmers of 14 and 15 years old (p <0,05). The processes of the increase in length of a body are a little slowed down at sportsmen after 15 years old.

Big indicators of a sweep of hands are a sign of the best opportunities of the sportsman. If a sweep of hands is more than length of a body, the increased suitability is observed. These data can be also used at the determination of individual speed and "step" of a cycle of fungal movements [3]. So, on this indicator the greatest size of a sweep of hands is noted at swimmers of 17-18 years old (190,19±3,36 sm), and the smallest at sportsmen of 14 years old (178,15±5,17 sm). The noticeable distinction is noted between the group models of swimmers of 14 and 15 years old (8,9 sm).

The insignificant divergence of values among representatives of the various age groups of 14-18 years old is noted on indicators of length of a hip, a shin and a foot at swimmers.

The greatest size of a body weight at swimmers of 17-18 years old is (76,35±6,00 kg), and the smallest is (61,79±5,45 kg) at sportsmen 14 years old. The reliability of distinctions on an indicator of a body weight is revealed between groups of sportsmen of 14 and 15, 15 and 16 years old (p<0,05). Thus the most essential distinction of this indicator is noted between sportsmen of 15 and 16 years old – 7,54 kg.

Index Quetelet represents the relation of a mass to a length of a body and reflects the level of physical development of the sportsman. Its greatest values are revealed at sportsmen of 17-18 years old (411,35±27,57 g · sm⁻²). The sportsmen having an indicator, bigger in comparison with other swimmers, are more massive,
i.e. possess bigger weight per unit length of a body. Therefore, their potential opportunities in the development of bigger power in the fungal movement are slightly higher concerning other swimmers. The noticeable change of this indicator is noted between groups of sportsmen of 15 and 16 years old.

Some researches show that the body profile is wider, the bigger carrying power it possesses that reduces the water resistance operating on the swimmer [4]. Indicators of a width of shoulders and pelvis are higher in the age group of 17-18 years old. Thus in indicators of an index the relation of a width of shoulders to a width of pelvis the greatest distinctions are noted between swimmers of 14 and 15 years old.

Its functionality depends on the sizes of a body of a person: VCL, oxygen consumption, buoyancy. The vital capacity of lungs is connected with buoyancy of a body in turn [1; 4]. Buoyancy of a body indirectly characterizes hydrodynamic qualities of swimmers. The carried-out analysis of parameters of functional indicators of swimmers showed that the greatest values of VCL are noted at sportsmen of 17-18 years old (5,89±0,72 l), and the smallest at sportsmen of 14 years old (5,06±0,73 l). This indicator significantly doesn't change, but systematically increases between various age groups.

It is known that it is possible to judge the degree of the development of muscle mass of segments of extremities by the girths sizes of a shoulder, a forearm, a hip and a shin indirectly that in a certain measure characterizes manifestation of power qualities at sportsmen [1]. Thus the noticeable distinctions of these indicators are revealed between groups of swimmers of 15 and 16 years old.

The greatest indicators of a girth of a thorax at rest are recorded at swimmers of 17-18 years old (97,69±2,72 sm), and the smallest is at sportsmen 14 years old (90,8±4,08 sm). The noticeable increase is observed between groups of swimmers of 14 and 15 years old (2,48 sm), 15 and 16 years old (3,46 sm) in this indicator.

The indicator of an absolute surface area of a body considerably increases at swimmers from 14 to 16 years old (from 1,77±0,10 to 1,97±0,10 sq.m), and then rates of its growth are slowed down. The insignificant distinction of this indicator is noted between sportsmen of the age groups of 16 and 17-18 of years old (0,05 sq.m). Thus the greatest sizes are observed at swimmers of 17-18 years old (2,02±0,11 sq.m).

Besides the anthropometrical indicators, characteristics of special flexibility and specific features of mobility in joints were studied at swimmers. Thus some fluctuations between the various age groups of sportsmen are noted. So, the analysis of the mobility in shoulder joints of swimmers showed that the best indicators (33,0±24,91 sm), and in the test "inclination down, standing on an eminence" – in the group of 16 years old (18,08±7,14 sm) are noted at the 14-year age at swimmers.

A high jump and a long jump from a place were used for the definition of a level of the development of high-speed and power abilities. So, the greatest indicators are noted at swimmers of 16 years old in the test a long jump (249,0±23,98 cm), and in height are at sportmen of 17–18 years old (55,40±9,21 cm). In these tests the essential distinctions of indicators between the groups of 15 and 16 years old are noticeable (33,5 and 11 sm respectively).
Thus, characteristics features of model morphofunctional indicators of sportsmen–swimmers of 14-18 years old were revealed during the conducted research.

For the purpose of the determination of an individual level of physical development of the sportsman it is recommended to carry out the comparison to reference indicators for a similar age group of persons and to find a difference in indicators from a standard. Coaches can be guided by these data at a selection and with a bigger degree of probability to reveal prospects of sportsmen in swimming at a certain stage of long-term training.

Conclusions:
1. Features of the growth rate of various indicators of total and girth sizes of a body, functional indicators and indexes of physical development of the strongest swimmers of Ukraine in the age range of 14-18 years old are revealed.
2. Model characteristics of a morphofunctional state reflect features of maturing of an organism, the level of the development of specific physical abilities of young swimmers and provide the reliable forecast of their potential opportunities at the stages of the specialized – basic preparation and the maximum realization of individual opportunities.
3. The offered model morphofunctional criteria of swimmers of 14-18-year-old supplement the knowledge of a constitution of young swimmers and arm trainers with standard criteria for carrying out the selection of perspective young swimmers in specialized CYSS, SCYSOR and SHSS.

Prospects of further researches are connected with studying of features of morphofunctional characteristics of young sportswomen-swimmers.

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FUNCTIONAL STATE OF THE CARDIOVASCULAR SYSTEM AT FEMALE BASKETBALL PLAYERS OF A TEAM OF THE FIRST LEAGUE IN THE COURSE OF CARRYING OUT MEDICAL AND PEDAGOGICAL OBSERVATION

Abstract. Purpose: to define types of vascular reactions and tolerance to physical activity at female basketball players of the I-League. Material and Methods: analysis of scientific and methodical literature; medical and pedagogical supervision; methods of mathematical statistics. Results: the data about types of vascular reactions and tolerance to physical activity received by means of carrying out the PWC$_{170}$ test in the course of medical and pedagogical supervision at female basketball players of the I-League are considered. Conclusions: it is revealed that violations of adaptation of the cardiovascular system and the decrease in the level of fitness of an organism to a loading are observed at sportswomen. It is established that the incorrectness of educational and training process is associated with the decrease in tolerance and mainly atypical types of vascular reactions to a loading.

Keywords: the PWC$_{170}$ test, arterial pressure, heart rate, types of vascular reactions, tolerance for a loading.

Introduction. Medical and pedagogical observations (MPO) have to be made systematically for persons who go in for physical culture and sport. MPO provide medical researches in the course of training which are conducted together with a coach. But, as a rule, it is paid not enough attention to the question of training of sportsmen in traditional system. The made observations and researches give the chance to specify the level of a functional condition of an organism, the influence of physical activities on an organism of persons who go in for sports, its fitness and thus to promote the management of the educational and training process.

Enough attention is paid to the question of MPO in literature, but it doesn't reduce its relevance. Medical and pedagogical observations allow deepening and expanding possibilities of an assessment of special fitness of a sportsman, the development of an optimum mode and a technique of training. A team-work of a coach and a doctor – is a basis of the efficiency of the educational and training process. Such activity provides an improving orientation of classes and sports improvement, helps to warn and to find signs of violations in time, promotes the correct development of fitness and he achievement of the highest level of sportswear [1].

The formation of a certain level of fitness during the whole sports season and in a long-term cycle of preparation is caused by a sport, a concrete plan of training, a
degree of its compliance to specific features and a level of preparedness of a sportsman [2].

It isn't possible to reach good results, having avoided loss of health without an optimum balanced control of functional preparedness. The improvement of the training process is connected with the search of the most effective options of combination of loadings with different intensity and new forms of the organization of training classes [3].

At present physical working capacity is the most widely investigated in sports practice, representing undoubted interest for experts both medico-biological, and sports pedagogical directions. Physical working capacity – is one of the most important components of sports success. This quality is also determinative in many types of a production activity, is necessary in everyday life, in sport and is collateral displays a condition of physical development and health of a person, his suitability to classes on physical culture and sport. Modern highest sporting achievements are impossible without the maximum tension of physical and spiritual forces of a person. Therefore, the knowledge of these regularities is necessary both to a coach, a sports doctor, and to a sportsman [4].

The high degree of fitness of a sportsman is characterized by an optimum level of the development of functionality of an organism that predetermines the possibility of achievement of high sports results in combination with technical, tactical and psychological preparedness of an organism.

The main changes which are observed in organisms of sportsmen, happen in the cardiovascular system (CVS) first of all. The cardiovascular system serves as a thin indicator of a price of adaptation of an organism, both to different factors of environment, and to physical activities. If training loads are picked up irrationally, don't answer the age, to the level of preparedness and specific features of the sportsman, in the presence both internal, and external factors can appear different functional violations: overfatigue, overtraining that are followed by the deterioration of adaptation to physical activities, change of functional and psycho-emotional states.

The accounting of cardiovascular reactions of an organism to a training load allows increasing the efficiency of classes by the optimization of norms of loading, depending on its specific features. In our opinion, adaptation of the cardiovascular system to physical activities at basketball players conducts in the training process for the achievement of the level of fitness and sports success. All this also defined the relevance of this work.

Communication of the research with scientific programs, plans, subjects. The research was conducted according to a subject of the plan of RW of Kharkov state academy of physical culture 2.8. "Improvements of the educational and training process in sports" (number of the state registration is 0111U003126).

The aim of the research: to define types of vascular reactions and tolerance to physical activity at basketball players of the first league on a bicycle ergometer due to the PWC170 test.

Material and methods of the research. The research was conducted in scientifically problem laboratory on the basis of Kharkov state academy of physical culture. 19 basketball players of a team the I – League of BC "HAI" took part in the
research. Indicators of a type of vascular reaction and tolerance to physical activity were defined due to the PWC\textsubscript{170} test which was carried out on the bicycle ergometer of the company Kettler by means of the computer system CardiolabSens (production of scientifically research institute "HAI-Medika" in Kharkov) behind the generally accepted technique of V. L. Karpman (1969).

**Results of the research and their discussion.** It was established that the average age of basketball players of the team makes 16,2±0,58 years old, the weight of sportswomen is 65,3±4,60 kg before carrying out the PWC\textsubscript{170} test. It allowed establishing a loading size for each female basketball player. The sportswoman carried out the first loading on the bicycle ergometer which is appointed according to her age and weight. The work duration is 3 minutes. Then the female basketball player had a rest 3 minutes. Further the size of the 2nd loading was defined. The operating time is 3 minutes. Pedal frequency on the bicycle ergometer made 60 turns for a minute. Indicators of HR were counted for the last 30 s 3 minutes of each stage and after every minute of rest. The measurement of AP was conducted at the end of each degree of loading, without stopping rotation of pedals of the bicycle ergometer (tab. 1).

<table>
<thead>
<tr>
<th>Indicators</th>
<th>At rest</th>
<th>1 stage</th>
<th>2 stage</th>
<th>Relaxation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR, bpm\textsuperscript{-1}</td>
<td>70,22±1,62</td>
<td>148,89±20,70</td>
<td>173,44±19,58</td>
<td>76,70±9,55</td>
</tr>
<tr>
<td>APs, mm mer.col.</td>
<td>102,80±4,60</td>
<td>126,20±14,51</td>
<td>146,11±16,04</td>
<td>100,30±11,97</td>
</tr>
<tr>
<td>APd, mm mer.col.</td>
<td>62,8±2,36</td>
<td>56,20±6,33</td>
<td>50,00±6,99</td>
<td>58,80±6,90</td>
</tr>
<tr>
<td>Time of renovation of HR</td>
<td>5,23±0,24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time of renovation of AP</td>
<td></td>
<td></td>
<td>6,12±0,16</td>
<td></td>
</tr>
</tbody>
</table>

It was established that HR increased on average on 71,11 bpm\textsuperscript{-1} on the second minute of the 1 stage and continued to rise on average to an indicator of 148,89±20,70 bpm\textsuperscript{-1}. Fluctuations of HR happened at 5 female basketball players within 126–142 bpm\textsuperscript{-1} during the 1 stage. At the 1st stage the loading on the bicycle ergometer was observed the increase of indicators of APs on average on 21,3 mm mer.col. at female basketball players and continued to rise on average to an indicator of 126,20±17,01 mm mer.col. Indicators of APd, on the contrary, lowered on the 2nd minute of the test to an indicator 54,10±7,42 mm mer.col. on average on the group, on the 3rd minute of work rose a little to 56,20±6,33 mm mer.col. But the analysis of individual changes in indicators of APd showed that APs raised at 6 sportswomen at the beginning of the work, at 4 – lowered, and at 9 female basketball players – remained without changes (pic. 1).

Indicators of HR reached 179,78±24,27 bpm\textsuperscript{-1} on average on the group in 2 minutes during the performance of the 2nd stage of loading and in 3 minutes – 173,44±19,58 bpm\textsuperscript{-1}. 
Pic. 1. Changes of APd during the 1st stage of the PWC$_{170}$ test, %

Studying of individual indicators found out that HR indicator fluctuated within 156–170 bpm$^{-1}$ generally at female basketball players at the 2nd stage, and such indicators of HR, as 200 and 187 bpm$^{-1}$ were noted at four sportswomen.

Indicators of APs of loading continued to grow and reached on average 131,60±16,04 of mm mer.col. on the group in 1 minute of the 2nd stage, on the 3rd minute – 146,11±16,04 mm mer.col. Studying of individual indicators found out that the indicator of APs fluctuated within 140–160 mm mer.col. generally at basketball players, and four sportswomen had noted the indicator of APs of 120 mm mer.col. APd indicators, on the contrary, tended to decrease and reached on average 45,10±6,99 of mm mer.col. on the group in 2 minutes of the 2nd stage of loading and on 3 minutes – 50,00±6,99 mm mer.col. Studying of individual indicators found out that the indicator of APd fluctuated within 40–50 mm mer.col. generally at basketball players, four sportswomen had noted indicator of APd of 80 mm mer.col., and in two – 30 mm mer.col. There weren’t stops during the performance of the planned loading in performing the work at any of sportswomen. During 3 minutes of rest HR indicators gradually came back to initial indicators, but so they weren’t reached, that is we observed a delay of renewal of indicators of HR and AP.

Most of sportswomen had no complaints to a state of health during the test of bicycle ergometer, but short wind was observed at three basketball players at the 2nd stage, 3 basketball players complained of fatigue in feet, one had complaints to pain in muscles of shins.

The analysis of changes of indicators of HR and AP gave the chance to establish the reaction of CVS to loading during the test PWC$_{170}$ which allowed finding a type of reaction and tolerance to physical activity at each basketball player. So, it was established that only 22,22% of female basketball players have a normotonic type of vascular reaction to loading, and others – have atypical, namely 44,45% of sportswomen have a dystonic type of reaction to the carried-out loading, 22,22% stepped type, 11,11% hypotonic type (tab. 2).
Table 2

Indicator of a type of vascular reaction and tolerance to physical activity at basketball players of the team of the first league

<table>
<thead>
<tr>
<th>Indicators</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of vascular reactions, %</td>
<td></td>
</tr>
<tr>
<td>Normotonic</td>
<td>22,22</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>–</td>
</tr>
<tr>
<td>Hypotonic</td>
<td>11,11</td>
</tr>
<tr>
<td>Dystonic</td>
<td>44,45</td>
</tr>
<tr>
<td>Stepped</td>
<td>22,22</td>
</tr>
<tr>
<td>Tolerance to physical activity</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>66,67</td>
</tr>
<tr>
<td>Average</td>
<td>33,33</td>
</tr>
<tr>
<td>Low</td>
<td>–</td>
</tr>
</tbody>
</table>

All types, except normotonic, are atypical vascular reactions and can be predictive as the development of violations from the cardiovascular system. All this needs the corresponding correction of the educational and training process and the optimization of physical activities.

High tolerance to physical activity was found at 66,67% of female basketball players, and in 33,33% was average (pic. 2).

There were not revealed any features at all sportswomen, except one on the electrocardiogram which was removed automatically during the test performance. Violation of processes of the repolarization and the decrease of traffic of myocardium of the left ventricle were recorded at one female basketball player. Consultation of a cardiologist was recommended to the sportswoman.

Pic. 2. Tolerance to physical activity at basketball players during the PWC<sub>170</sub> test, %

All this gives the chance to claim about the violation of adaptation of the cardiovascular system to loadings, the decrease in the level of fitness of an organism to loading.

Conclusions. Thus, the above gives the grounds to claim that the decrease in functional ability of the cardiovascular system to loadings is observed when carrying
out MPO by means of the PWC$_{170}$ test at basketball players of the first league that needs the corresponding correction of the educational and training process and the optimization of physical activities.

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RESEARCH OF AUXILIARY SUPPORTING MEANS IN SWIMMING TRAINING OF ADULTS, WHICH ARE AFRAID OF WATER

Abstract. Purpose: To consider the possibility of effective teaching swimming adults suffering from hydrophobia, using auxiliary equipment. Materials and Methods: The study involved 37 people aged 22-45 years. Applied: analysis of the educational process of learning to swim, questioning, expertgaya assessment techniques, teacher observation and experiment, mathematical statistics. Results: This study suggests that the formation of swimming skills is faster and more effective when used the auxiliary equipment. In the experimental group, four swimming styles were mastered by 59% and in the control by 18%. Conclusions: The proposed method of training of adults, with auxiliary equipment, allows to overcome the feelings of fear, accelerates the learning process and improve its efficiency.

Key words: recreation swimming, teaching methodology, adults, hydrophobia, auxiliary equipment.

Setting of a problem. Analysis of the last publications. Swimming is one of the most popular and favourite sports in our country. Now swimming is available to various age groups. Importance of swimming is great. It well influences activity of cardiovascular and respiratory systems, develops muscles, increases organism resilience to catarrhal diseases, strengthens nervous system [1; 5]. Recreational swimming is carried out for the purpose of a hardening, the prevention of diseases, strengthening of health, increase of working capacity and to distance the signs of aging [8; 9].

To begin recreational swimming, it is necessary to learn to swim. Ability to swim opens for the person new opportunities of a relaxation and active recreation [3; 6; 7; 10]. When training in swimming of adults there are difficulties which aren't present when training children. Trainers, training in swimming of adults, face manifestation of hypersensibility and other undesirable reactions at stay in the water environment. Usually it is called fear of water, hydrophobia. For overcoming of hydrophobia considerable psychological efforts are required [2; 4; 8].

When mastering the skill of swimming, adults more often than children are using supportive applications. Such supportive applications as inflatable oversleeves, floats, swimming boards, poles, "noodles" are giving to the beginner confidence in his ability to learn to swim.

By psychological criterions, while training in swimming of adults, four groups are allocated [6]. If in the first group of trainees water causes positive emotions and there is a desire to develop skill of swimming, in the fourth group, trainees feel panic.
fear of an entrance to water and depth. Using the regular technique when training in swimming of this category of people is often ineffectively. The analysis of publications indicates the need of search of other forms and approaches to training in swimming of the adults having hydrophobia [2; 3; 6; 8].

The offered subject is caused by that a large number of the adults wishing to visit groups of recreational swimming, but badly swimming or who aren't able to swim, annually meets. Thus 8–13 % of their number have hydrophobia. Such trainees demanding the higher attention to themselves and a special technique of training in swimming [1; 2; 4].

**The subject of this work** is to research the possibility of effective training in swimming of the adults, feeling fear of the water environment, with use of the supportive applications.

**Main objectives of research:**
1. To study experience on training of adults in swimming;
2. To reveal a positive effect in formation of swimming skill as a result of application of the auxiliary supporting tutorials;

For the solution of the main objectives we used the following methods of researches: analysis and generalization of scientific and methodical literature; analysis of educational process of training in swimming of adults; questioning and oral poll; pedagogical supervision, experiment.

**Organization and results of research.** The conducted questionnaire of trainees in groups of recreational swimming of the public pool "Pioneer" in Kharkov (October, 2013) which badly swam or weren't able to float and thus had hydrophobia, showed that hydrophobia can arise prior to classes in water: the person heard that people sink or itself was present in case of accidents. Therefore, after the conducted poll we created groups of people not able to swim, those who were having hydrophobia, and applied a special technique on elimination of various forms of fear (hydrophobia, fear of depth) which are shown at elementary swimming education.

The research of efficiency in training swimming with use of the auxiliary supporting tutorials, was carried out on adults of age 22–45, which weren't able to float and had the initial swimming skill from 0 to 5 m. Evaluation of swimming technique was carried out by three experts on a 10-point scale ranging from 1-3 balls – "Low" : 3-4 blunders and 5-7 minor ; from 4-7 balls – " average " : 1-2 blunders and 3-4 minor ; 8-10 balls – a "high level" : 1-5 minor.

From trainees 2 groups were created: the control group – 15 persons, and experimental group – 12 persons. Classes with groups were given 3 times a week for 45 min. in water, with one teacher. Sequence of learning swimming styles in control group: a freestyle – backstroke – breaststroke – the simplified version of butterfly ("dolphin") (when hands are making a fungus in water like in breaststroke); in the experimental: a breaststroke – freestyle – backstroke – the simplified version of butterfly ("dolphin").

Training in control group was held by a traditional technique, in experimental group – by means of the supporting applications of individual purpose (floats, boards, etc.), and also the supporting means of group use (floating constructions from the floats connected). Besides, when training, the special devices for an insurance of
swimming trainees – a pole, noodles (the long flexible cylinders made of foam), swimming boards and swimming belts were quite often used.

In the course of training in experimental group, we applied special exercises to formate the skills, preventing appearance of water-danger fear and creating favourable conditions for development of swimming movements. All exercises for elementary education of the adults having hydrophobia were united in system and were carried out with keeping the didactic principles (in particular, conscious training), with gradual reduction of a support.

The training material was intended for 36 classes and was distributed as follows: the first four classes were devoted to check out the initial swimming readiness and to carry out the exercises on mastering with water, 10 classes – were dedicated to learn a breaststroke style, 8 classes – for learning a freestyle, 6 – for a backstroke, 6 – for the simplified butterfly ("dolphin"), 2 last classes – for improvement of the studied styles of swimming and for checking the results of training.

Training process consisted of several stages: fact-finding, initial and the main. In a fact-finding stage such exercises as walking on a dock apron, knee-bends in water, acceptance of a prone position on a breast and on a back (with support and without), lowering of the face in water in swimming googles, and then without them (with closed, and then with opened eyes), breathing exercises by means of which the trainees got used to waterfeel, were used. Exercises on mastering with water were carried out in parallel – on small and deep parts of the pool. They accustomed to two provisions – in vertical, and then in horizontal. As a result already through 3–4 lessons the trainees could carry out various exercises, which were supporting them on a water surface both on small, and on a deep place. At the initial stage the trainees mastered movements on a water surface with different swimming styles on the distance of 25 m. Examinees were offered to master technique of different elements of a swimming style in position on a breast and on a back on small part of the pool with support (with help of a pole, noodles or a swimming board), and then without support. Further the same movements were carried out on deep part of the pool with the supporting means. Then them passed to mastering of technique of swimming styles without carrying hands out to a water surface and without using of the supporting means. Distinctive feature of experimental group was that in preparatory part on the first classes in mastering of a new style, the various all-developing, imitating exercises (on the land) were included, and more than 50 % of time of the main part of classes (in water) the supportive applications were used.

The main stage began with independent swimming the facilitated styles, both on small and on deep part of the pool; tasks with change of the movement direction on a water surface were offered; examinees were trained in breath in extreme situations; carried out jumps from a side on deep part of the pool with the emersion by means of elementary feet and hands movements, and also with the subsequent independent swimming; were sliding under water.

As a result of training in experimental group higher rates, both in length of the swimming distance, and on technology of swimming were reached. The experiment
showed advantage of a technique of training with use of the auxiliary supporting tutorials of the adults having hydrophobia against traditional techniques (table 1).

**Table 1**

Comparative data of results of traditional training in swimming and training in swimming of adults, having hydrophobia with the help of supportive applications

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Groups</th>
<th></th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CG (n=15)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial swimming skill (ISS), m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–5</td>
<td>0–5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of classes</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results of trainings (average)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast stroke</td>
<td>meters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13±1,47</td>
<td>23±2,50</td>
<td>3,45</td>
<td>&lt;0,01</td>
<td></td>
</tr>
<tr>
<td>points</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7,0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freestyle</td>
<td>meters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9±1,20</td>
<td>21±1,65</td>
<td>5,88</td>
<td>&lt;0,001</td>
<td></td>
</tr>
<tr>
<td>points</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8,0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back stroke</td>
<td>meters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15±1,51</td>
<td>25±2,38</td>
<td>3,54</td>
<td>&lt;0,01</td>
<td></td>
</tr>
<tr>
<td>points</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9,0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simplified butterfly (&quot;dolphin&quot;)</td>
<td>meters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8±0,93</td>
<td>17±1,69</td>
<td>4,66</td>
<td>&lt;0,001</td>
<td></td>
</tr>
<tr>
<td>points</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6,0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastered 4 swimming styles, %</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Apparently from table 1, in control group average swimming distance isn't satisfactory, technique points are low (the assessment was made on a 10-ball scale). All this tells about low efficiency of an educational method.

In experimental group formation of skills in all swimming styles was much more successful. In experimental group 59% of those, who were engaged, seized skill in 4 swimming style. In control group there were only 18% seized. Swimming technique points in experimental group are indicating more successful rational movements mastering. The positive effect of training in swimming became possible as a result of the auxiliary supporting tutorials application. Increase of training effect was intensified by such pedagogical methods as presentation, sequence, availability, repetition of the movements studied.

**Conclusions:** Use of the auxiliary supporting tutorials allows to quicker overcome feeling of hydrophobia (reducing number of accidents on water), to create rational technology of swimming that in turn affects the size of the swimming distances. This technique of training promotes increase of swimming readiness of the population, that can increase public swimming pools attendance.

**Prospect of further researches** consist in development of programs for training an adult part of population, in which, along with the traditional auxiliary equipment, more difficult modern technical means of training will be used.

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IMPROVING THE PERFORMANCE OF FLEXIBILITY AND COORDINATION ABILITIES UNIVERSITY GIRLS-STUDENTS IN THE PROCESS OF HATHA-YOGA CLASSES DURING THE UNIVERSITY YEAR

Abstract. Purpose: to determine the results of changes in terms of flexibility and coordination abilities of university students in the process of hatha-yoga developed by the program during the year. Material and methods: a pedagogical experiment was attended by 60 students of the university at the age of 17–20 years. Conducted pedagogical experiment and educational testing, the results were processed by methods of mathematical statistics. Results: the control group students only attended university studies in physical education, experimental – three times a week, hour and a half fitness classes on hatha-yoga. Conclusions: in the pedagogical experiment proved the effectiveness of the developed program on hatha-yoga in extracurricular work of students of the university; the average results recorded characteristics of flexibility and coordination abilities of university students and calculated at the end of the university year, the percentage improvement in these indicators.

Keywords: hatha-yoga, students, university classes, flexibility, coordination.

Introduction. The analysis of a state of health and a level of physical fitness of student's youth considerable gives concern among teachers, physiologists, physicians and specialists of other branches [1; 6; 7]. Independent preventive actions and program classes in physical training in higher educational institutions only slightly improve the available situation. However according to normative documents it is possible to supplement the training university program with the organization of an out-of-class work of a sports-improving and well-mannered orientation [1; 8] which will promote the solution of a complex of derivative tasks. The positive effect is provided to be received at the creation of student's groups in which to apply modern fitness of technology and well-known improving systems systematically. Yoga is one of the popular improving systems in the world that extends among the domestic population. In turn, the systematic use of this improving system on the out-of-class classes needs carrying out a scientific argumentation concerning its influence on a student's organism and granting methodical recommendations concerning features of a physiologic development and a physical condition of the contingent of those who makes the created group. The relevance to the research is added by the positive complex influence of the improving system of yoga on a female organism and
therefore there is a need to determine the level of shifts in indicators of separate physical qualities of students within an academic year.

In modern publications the considerable effect from practice of yoga classes is noted [4;15], and in particular for women that is confirmed [2; 5; 9; 13] where the application of exercises on yoga for the correction of a bearing and the increase of a level of their health is carried out. We developed the program of Hatha yoga classes (a type of yoga is accentuated on the performance of physical exercises – "asanas") for students of an initial level of preparedness that recommended for the realization in an out-of-class work of higher educational institutions [11;12]. In this work indicators of characteristics of flexibility and coordination abilities of students of universities are lighted that as a result of Hatha yoga classes within an academic year receive significant improvements.

**The objective of the research:** to determine results of shifts in indicators of flexibility and coordination abilities of students of universities in the course of Hatha yoga classes by the developed program within the academic year.

**The task of the research:**
1. To make a pedagogical experiment concerning the application of the developed program on Hatha yoga on the out-of-class work of students of a higher educational institution.
2. To record average results of characteristics of flexibility and coordination abilities of students of universities at the beginning, in the middle and at the end of the academic year who regularly visit the out-of-class Hatha yoga classes.
3. To carry out a percentage comparison of shift of indicators of the separate characteristic of flexibility and coordination abilities of students of universities during the experimental period of classes by yoga.

**Material and methods of the research:** analysis of data of special scientifically methodical literature and Internet, pedagogical tests, pedagogical experiment, methods of mathematical statistics.

The forming experiment within the academic year was made for the verification of the offered improving program on Hatha yoga which was applied in the conditions of the out-of-class work of students of a higher educational institution. The general totality of the experiment was made by 60 students of a higher educational institution of the first and second years. The control and the experimental groups of students by the age of 17-20 years old on 30 persons everyone are created which weren't engaged in any sports and improving systems or sport, that is had the initial level of preparedness. The test fixed at the beginning of the experiment that the average indicators of students of both groups had no essential differences (p>0,05) at issuant characteristics of physical qualities.

The student of the control group attended only classes on physical training for the achievement of the purpose of the experiment which are provided by the training program for a higher educational institution. The students of the experimental group, except planned studies on physical training, in addition in the conditions of the out-of-class work three times for a week attended improving classes on Hatha yoga one and a half hour where carried out the training program which is lighted in a source [12].
The positive influence of the offered program was estimated behind changes of the received results of the control tests in the middle and at the end of the experimental period that by data [3; 10] gives an opportunity to define informative characteristics of the available condition of the tested quickly and objectively. The comparative method was applied to the analysis of the recorded average indicators of students of the control and the experimental groups. The analysis was carried out in each group separately, namely: results of the control test of students at the beginning of the experiment were compared to indicators in the middle and at the end of the academic year behind Student's technique and the percentage changes between average results of characteristics of flexibility and coordination abilities were calculated at the beginning and at the end of the experimental academic year.

The research of characteristics of flexibility of students in the forming experiment was carried out by means of the battery of the following pedagogical tests: forward and cross splits, a shoulder joint, lateroflection of a spine pillar, bending of a spine pillar at an inclination forward from a position standing on a gymnastic lava, extension of a spine pillar in the test "bridge". Tests for the determination of coordination abilities were such: shuttle run of 4x9 m, static balance with opened and closed eyes.

**Results of the research and their discussion.** Carrying out the analysis of the studied flexibility indicators, it is visible from the table that the absent reliability of divergences (p>0.05) between the majority of the recorded results for a year in the control group of students and, on the contrary, statistically significant (p<0.05 and p<0.01) results between all marks of tests for identification of dynamics of flexibility were observed during the experimental period in the experimental group of students. So, the level of forward split and cross split made 159.67 gr., 149.83 gr. in the control group of students at the beginning of the experiment and in the middle of the experiment – 162.03 gr. and 151.93 gr., at the end on 3% and 4% was better, than at the beginning – 165.07 gr. and 155.93 gr. respectively. In the experimental group similar results of students increased from 160.27 gr. within the academic year and 148.87 gr. at the beginning of the academic year till 167.23 gr. and 156.73 gr. after the second pedagogical testing and till 171.20 gr. and 162.17 gr. at the end of the experiment that made the general improvement on 7% and 9%. The percentage improvement of an indicator of mobility of a shoulder joint at students of control group during the forming experiment made 8% (69.07; 71.13; 74.63 gr.). In the experimental group of students the improvement took place at the level of 15% and according to the results of three intentions within the academic year: 69.73; 75.83; 80.13 gr. At the beginning of the experiment lateroflection of a spine pillar found indicators of the control group of students with a mark 14.27 gr., in the middle of the experiment – 15.23 gr., and at the end it was on 11% better, than at the beginning – 15.87 gr. In the experimental group similar results are found out in the students that within the academic year increased from 14.37 gr. till 16.73 gr. after the second testing and till 19.33 gr. at the end of the experiment that made the general improvement at 35%.
The percentage comparison of indicators of manifestation of flexibility and coordination abilities of students of the control group (n=30) and the experimental group (n=30) during the experimental period of Hatha yoga classes

<table>
<thead>
<tr>
<th>Control test</th>
<th>Unit of measure</th>
<th>Groups</th>
<th>Indicators at the beginning of the experiment</th>
<th>(\bar{X}_1)</th>
<th>m</th>
<th>p</th>
<th>Indicators in the middle of the experiment</th>
<th>(\bar{X}_2)</th>
<th>m</th>
<th>p</th>
<th>Indicators at the end of the experiment</th>
<th>(\bar{X}_3)</th>
<th>m</th>
<th>p</th>
<th>CG(\rightarrow)EG, p</th>
<th>%</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>gr.</td>
<td>CG</td>
<td>159,67</td>
<td>1,56</td>
<td>&gt;0,05</td>
<td>(\bar{X}_1)</td>
<td>162,03</td>
<td>1,25</td>
<td>&gt;0,05</td>
<td>(\bar{X}_2)</td>
<td>165,07</td>
<td>1,38</td>
<td>&gt;0,05</td>
<td>(\bar{X}_3)</td>
<td>&lt;0,01</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EG</td>
<td>160,27</td>
<td>1,65</td>
<td>&lt;0,01</td>
<td>(\bar{X}_2)</td>
<td>167,23</td>
<td>1,16</td>
<td>&lt;0,05</td>
<td>(\bar{X}_3)</td>
<td>171,20</td>
<td>1,03</td>
<td>&gt;0,05</td>
<td>(\bar{X}_3)</td>
<td>&lt;0,05</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>gr.</td>
<td>CG</td>
<td>149,83</td>
<td>1,78</td>
<td>&gt;0,05</td>
<td>(\bar{X}_2)</td>
<td>151,93</td>
<td>1,83</td>
<td>&gt;0,05</td>
<td>(\bar{X}_3)</td>
<td>155,93</td>
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<tr>
<td></td>
<td></td>
<td>EG</td>
<td>148,87</td>
<td>1,25</td>
<td>&lt;0,01</td>
<td>(\bar{X}_2)</td>
<td>156,73</td>
<td>1,38</td>
<td>&lt;0,01</td>
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<tr>
<td>3</td>
<td>gr.</td>
<td>CG</td>
<td>69,07</td>
<td>1,52</td>
<td>&gt;0,05</td>
<td>(\bar{X}_2)</td>
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<td>0,67</td>
<td>&lt;0,01</td>
<td>(\bar{X}_2)</td>
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<td>&lt;0,01</td>
<td>(\bar{X}_3)</td>
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<td>5</td>
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<td>8,13</td>
<td>0,67</td>
<td>&gt;0,05</td>
<td>(\bar{X}_2)</td>
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<td>0,62</td>
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<td>0,04</td>
<td>&lt;0,01</td>
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<td>10,64</td>
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<td>&lt;0,01</td>
<td>(\bar{X}_3)</td>
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<td>0,04</td>
<td>&lt;0,01</td>
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<td>&gt;0,05</td>
<td>(\bar{X}_3)</td>
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<td>15,39</td>
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<td>(\bar{X}_3)</td>
<td>&lt;0,01</td>
<td>22</td>
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<td></td>
<td></td>
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<td>6,16</td>
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<td>(\bar{X}_2)</td>
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<td>s</td>
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<td>1,56</td>
<td>&gt;0,05</td>
<td>(\bar{X}_2)</td>
<td>18,67</td>
<td>1,61</td>
<td>&gt;0,05</td>
<td>(\bar{X}_3)</td>
<td>20,77</td>
<td>1,65</td>
<td>&gt;0,05</td>
<td>(\bar{X}_3)</td>
<td>&lt;0,01</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EG</td>
<td>16,03</td>
<td>1,74</td>
<td>&lt;0,01</td>
<td>(\bar{X}_2)</td>
<td>23,87</td>
<td>1,87</td>
<td>&lt;0,05</td>
<td>(\bar{X}_3)</td>
<td>28,87</td>
<td>1,38</td>
<td>&lt;0,01</td>
<td>(\bar{X}_3)</td>
<td>&lt;0,01</td>
<td>80</td>
</tr>
</tbody>
</table>

*Note.* 1 – forward split; 2 – cross split; 3 – shoulder joint; 4 – lateroflection of a spine pillar; 5 – bending of a spine pillar at an inclination forward from a position standing on a gymnastic lava; 6 – extension of a spine pillar in the test "bridge"; 7 – shuttle run of 4x9 m; 8 – static balance with open eyes; and 9 – static balance with closed eyes.
An assessment of mobility of a spine pillar at an inclination forward from a position standing on a gymnastic lava found marks 8,13 sm, after the second intention – 9,07 sm at students of the control group at the beginning of experiment of, and at the end of the academic year the general improvement took place on 37% and made 11,13 sm. Similar results equaled 7,93 sm in the experimental group of students at the beginning of the forming experiment, in the middle – 10,47 sm, and the improvement on 96% with a mark 15,57 sm is fixed after the third intention. The results of the extension of a spine pillar in the test "bridge" at students of the control group at the beginning of the experiment made 53,47 sm, after the second intention made 53,03 sm, and at the end of the academic year improved till 51,53 sm that displayed the general improvement on 4%. In the experimental group the following indicators are found within the academic year, namely: at the beginning – 53,53 sm, in the middle – 50,47 sm, and after the third intention – 47,73 sm with the general improvement on 11%.

Characteristics of coordination abilities of students during the experiment were fixed by means of shuttle run of 4x9 m, static balance with the opened and closed eyes. Statistically significant (p<0,01) divergences are found only between indicators of the second and third testing in the control group of students for a year, statistically significant (p<0,01) results between all marks of pedagogical tests for the detection of coordination characteristics were observed during the experimental period in the experimental group of students. So, the percentage improvement of results of the students of the control group in shuttle run of 4x9 m made 5% with the recorded mark: 10,98; 10,83; 10,47 s. The similar improvement equaled 6% between output and final results within the academic year in the experimental group of students: 11,03; 10,64; 10,34 s.

The results of static balance with the opened and closed eyes at students of the control group had a mark 84,97 s and 16,57 s at the beginning of the experiment, in the middle of experiment – 53,03 s and 15,23 s, and at the end – 51,53 s and 15,87 s that on 4% and 11% was better, than at the beginning. In the experimental group similar indicators of students within the academic year increased from 89,43 s and 16,03 s at the beginning of the academic year till 129,63 s and 23,87 s after the second testing and till 178,27 s and 28,87 s at the end of the experiment that made the general improvement on 99% and 80% respectively.

The statistically significant differences at p<0,05 and p<0,01 are fixed when comparing indicators of the manifestation of flexibility and coordination abilities of students of the control group (n=30) and the experimental group (n=30) at the end of the forming experiment (table) that testifies to the significant improvement of these characteristics and leads up the efficiency of the developed program on Hatha yoga for classes with students in the out-of-class work of the higher educational institution.

Conclusions:
1. The pedagogical experiment is carried out and the efficiency of the application of the developed program on Hatha yoga is proved in the out-of-class work of the students of the higher educational institution.
2. The average results of characteristics of flexibility and coordination abilities of the students of universities are fixed in the control and the experimental groups.
3. The percentage improvement of indicators of flexibility and coordination abilities of the students of universities is calculated at the end of the academic year.

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and the advantage of results of the experimental group is determined which was engaged according to the developed program on Hatha yoga.

Prospects of the subsequent researches. Carrying out the analysis is planned concerning the definition of the influence of an experimental technique on Hatha yoga for high-speed and power characteristics of students of universities within the academic year.

References:

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PHYSICAL TRAINING OF 30-40 YEARS OLD TOURISTS SKIERS TO SKI SPORTS HIKING

Abstract. Purpose: Compare the test results obtained at different stages of physical training of tourists skiers, immediately after passing of the ski sports hiking of the third category of complexity and 14 days after hiking. Determine the effectiveness of the designed program to improve the physical readiness of 30-40 years old tourists skiers. Material and Methods: 14 people aged 30 to 40 years old who have a different experience in water, hiking and mountain as well as ski-sport hiking took part in research. Analysis of scientific and methodical literature, pedagogical observations, pedagogical experiment, methods of mathematical statistics is used. Results: The test results of 30-40 years old tourists skiers which are the participants in the experimental group received at different stages of preparation and preparatory period and the results after passing ski sports hiking of the third category of complexity are processed. Their comparative analysis is held. Conclusions: It was found that the developed training program can effectively influence the physical readiness of tourists skiers, as well as all functions and systems that contribute to the successful passage of ski sports categorized hike.

Keywords: sports tourism, sports hiking, physical training, training program, experiment, exercises, results, testing, index.

Introduction. Sports tourism is an independent kind of sports belonging to the Unified Sports Classification and represents the most balanced kind of sports and wellness of a man activity. [3]. Despite the fact that sports tourism every year is becoming more and more popular, and thousands of new fans join the tourist movement, none of its kinds is not included in the Olympic program, and is not a professional sport. Of course, the competition is held for certain types of sports tourism in the various Championships, Cups, meetings, and training of athletes is engaged in leisure-tourist centers, clubs, station, tourist club of universities, enterprises and organizations. But at the same time, sports tourism is still developing on public principles, thanks to the enthusiasm of the tourists themselves. [13].

Sport hiking is a component, the most active and dynamic part of the tourist activity, combining on a voluntary basis fans of hiking, skiing, mountain, water, bike, car, motorcycle, speleohiking and fans to travel on gasketed ships of different classification [3, 4].

It follows that feature of sports tourism is, first of all, that hiking often goes in the extreme conditions of the natural environment where the group works in offline mode, providing optimal conditions for the route.
According to many authors [1, 2, 5, 12, 14] you must be physically and mentally prepared as well, you have a wide range of special knowledge of technique and tactic to overcome obstacles based on human physiology to pass the "thread" of the route.

*Physical training* is the main content of training in any kind of sports tourism and in skiing in particular, is inextricably connected with strengthening and increasing overall level of functional condition and health promotion of the tourist-skier. The high level of versatile physical training of all members of the group is one of the most important guarantees of successful going of the whole hiking.

*Physical training* tourist-skier aims to develop basic impellent qualities (endurance, strength, speed, agility) needed in ski hike. Physical training tourist-skier is divided into general and special. *General and special physical training* is becoming the leading kinds, where means of general physical training of tourists skiers are General developing exercises which are divided into two subgroups: a) general developmental preparations; b) exercises from other kinds of sports [6, 8, 11]. These exercises are mainly used in the snow-free season for the development of the physical qualities needed to tourist-skier. Exercises are chosen so that there was the greatest positive transfer of physical qualities from used kind to the main one – ski tourism. So, cross-country is used for the development of cross-endurance; long work with rubber shock absorbers is used for the development of strength endurance; sports games (basketball, handball, football) are used to develop agility, coordination and speed etc. [7, 9, 10, 15].

Special exercises are also divided into two subgroups: a) specially-preparatory; b) specially-supplied. Specially-preparatory exercises are used to develop the physical and willed qualities in relation to the ski tourism. Specially-supplied are used in order to study technique elements of ways of ski-movements.

**Connection with academic programs, plans, themes.** Studies carried out in accordance with the thematic plan of research of the Department of winter sports, cycling and tourism of Kharkov State Academy of Physical Culture (KSAPC) of the Ministry of Education and Science of Ukraine for 2013-17 years on the topic «Fundamentals of sport tourism in the recreational activities of different aged groups in Ukraine» (State registration number 0114U000366).

**Purpose of research:** Determine the effectiveness of designed program to improve the physical preparedness of 30-40 years old tourists skiers.

**Tasks of research:** 1) Develop a program of physical training of 30-40 years old tourists skiers in order to successfully passage of the ski-sport hiking of III-IV categories of complexity. 2) Experimentally test the effectiveness of the proposed program of physical training of 30-40 years old tourists skiers.

**Methods of research:** analysis of scientific and methodical literature, pedagogical observations, pedagogical experiment, methods of mathematical statistics.

**Organization of research:** Research was conducted in May – January 2012 – 2013 years. Experimental group consisted of 14 people aged 30 to 40 years old who have different experience of water trips, hiking and mountain hiking. Over the years, all members of the group engaged in various kinds of sports, many of them have
sports categories. At the beginning of the experiment, all members of the group had different experiences of ski sports tours.

Due to the fact that tourists are not professional athletes, and as a rule go in for several kinds of sports tourism, many years incessant training program cannot be. Accordingly, the period of preparation for categorical ski hiking was limited in time.

**Results of research:** Physical training includes exercises for the development of general endurance (hiking, cross-hiking, cross-country races, moving on roller skis, ski movement), as well as exercises to develop strength qualities (exercises at the gym, lifting weights, on the crossbar, parallel bars, etc.). In hours load was distributed as follows (tab. 1):

<table>
<thead>
<tr>
<th>№</th>
<th>Months</th>
<th>Hours</th>
<th>№</th>
<th>Months</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>May</td>
<td>23</td>
<td>6</td>
<td>October</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>June</td>
<td>23</td>
<td>7</td>
<td>November</td>
<td>35</td>
</tr>
<tr>
<td>3</td>
<td>July</td>
<td>25</td>
<td>8</td>
<td>December</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>August</td>
<td>27</td>
<td>9</td>
<td>January</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>September</td>
<td>30</td>
<td>10</td>
<td>sum</td>
<td>263</td>
</tr>
</tbody>
</table>

At the stage of the main experiment tests to assess the level of the development of physical qualities and functional conditions, which were used in the preparation stages were chosen. In May, August and January, the research of motive qualities and functional conditions of 30-40 years old tourists skiers’ organism was conducted (tab. 2).

Received data for pedagogical research during the preparation period have shown that the result of a 12-minutes’ run was increased during the experiments and it reached the maximum values in January. Overcoming of the distance in 12 minutes achieved the maximum values in January and was 1852.0 m, which was 185.0 m more in relation to indicators of May (t = 7,31; p <0.001), while at the same time the distance of running increased to 84.0 m (t = 4,22; p <0.001) and after the first stage of the research (May-August).

The number of jumping out within 30 sec. with 10 kg gradually increased, and in January it was 16.2 times, which was 2.3 times more (t = 2,39; p <0.05) than in May.

The results of tests, reflecting the general physical preparedness of 30-40 years old tourists skiers had higher results at the end of preparation period and increased in the number of the barbell squat with 20 kg to 6.6 times (t = 2,26; t = 6,36; p <0,05-001), in barbell squat with 50 kg to 5.5 times more (t = 2,99; p < 0.01).

The number of exercise flexion and extension arms with clap lying on the floor in August increased to 4.5 times (t = 3,04; p <0.01), while pulling up on the crossbar with a weight of 5 kg 2.3 times more (t = 2,59; p <0.05), in January the data of indicators in relation to the original data accordingly increased to 6.6 times more (t = 4,65; p <0.001) and 6 times more (t = 4,25 ; p <0.001).
**Table 2**

**Dynamics of indicators of 30-40 years old tourists skiers’ motive qualities in preparation period (n = 14)**

<table>
<thead>
<tr>
<th>№</th>
<th>Indicators</th>
<th>30-40 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>30-40 years old</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Мay</td>
</tr>
<tr>
<td>1</td>
<td>12-minutes’ run, m</td>
<td>1667,0±16,62</td>
</tr>
<tr>
<td>2</td>
<td>Jumping out within 30 sec. with 10 kg, numbers of times</td>
<td>13,9±0,86</td>
</tr>
<tr>
<td>3</td>
<td>Barbell squat with 20 kg, numbers of times</td>
<td>26,4±0,83</td>
</tr>
<tr>
<td>4</td>
<td>Barbell squat with 50 kg, numbers of times</td>
<td>4,8±0,60</td>
</tr>
<tr>
<td>5</td>
<td>Flexion and extension arms with clap lying on the floor, numbers of times</td>
<td>33,9±1,18</td>
</tr>
<tr>
<td>6</td>
<td>Pulling up on the crossbar with a weight of 5 kg, numbers of times</td>
<td>7,1±0,72</td>
</tr>
<tr>
<td>7</td>
<td>Lifting legs hanging on the wall bars with a weight of 5 kg, numbers of</td>
<td>23,8±1,06</td>
</tr>
</tbody>
</table>

Power indicators of abdominal muscles have also increased, and the maximum values in lifting legs hanging on the wall bars with a weight of 5 kg reached in January, increased to 5.4 times ($t = 2.94; p < 0.05$) relative to baseline values.

The analysis of the results of the functional conditions of 30 – 40 years old tourists skiers in the preparation period showed there were no statistically significant changes in blood pressure ($p > 0.05$) (tab. 3).

**Table 3**

**Dynamics of indicators of 30-40 years old tourists skiers’ functional conditions in preparation period (n=14)**

<table>
<thead>
<tr>
<th>№</th>
<th>Indicators</th>
<th>30-40 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Мay</td>
</tr>
<tr>
<td>1</td>
<td>BP systolic, mm Hg</td>
<td>119,7±1,83</td>
</tr>
<tr>
<td>2</td>
<td>BP diastolic, mm Hg</td>
<td>68,0±2,46</td>
</tr>
<tr>
<td>3</td>
<td>Frequency of heart rate, bpm^{-1}</td>
<td>86,2±1,09</td>
</tr>
<tr>
<td>4</td>
<td>ANAMC, con. units</td>
<td>64,7±2,42</td>
</tr>
<tr>
<td>5</td>
<td>AMC, con. units</td>
<td>158,0±2,00</td>
</tr>
<tr>
<td>6</td>
<td>MOU, l</td>
<td>4,6±0,13</td>
</tr>
<tr>
<td>7</td>
<td>VCL, ml</td>
<td>4620,0±55,38</td>
</tr>
<tr>
<td>8</td>
<td>Quetelet’s index, kg·cm²</td>
<td>23,4±0,91</td>
</tr>
<tr>
<td>9</td>
<td>Robinson's index, con. units</td>
<td>101,9±1,35</td>
</tr>
</tbody>
</table>
At the same time, systolic blood pressure reduced to 5 mm Hg (t = 1.70; p > 0.05) in August and to 6.2 mm Hg (t = 1.91; p > 0.05) in January, and diastolic to 5 mm Hg (t = 1.48; p > 0.05) and 5.2 mm Hg (t = 1.55; p > 0.05) relatively to May.

The results of the heart rates are operational indicators of the functional conditions of the cardiovascular system of 30-40 years old tourists skiers, which allowed to correct exercises during the training in the preparation period.

Indicators of frequency of the heart rates decreased with a set of training and statistically significant changed in August to 4.4 beats per minute\(^{-1}\) (t = 3.16; p < 0.01) and in December to 5.9 beats per minute\(^{-1}\) (t = 3.98; p < 0.01) relatively to indicators of May.

Anaerobic and aerobic abilities of 30-40 years old tourists skiers changed during the training in the preparation period. Indicators of anaerobic metabolic capacitance significantly increased to 8.7 con. units in January (t = 3.41; p < 0.01) relatively to the original indicators for the period from August to January, the difference was 4.7 con. units (t = 3.80; p < 0.01).

Aerobic indicators increased in August to 6 con. units (t = 2.43; p < 0.05) and in January to 7.9 con. units (t = 3.41; p < 0.01) relatively to the data of August.

The indicators of maximal oxygen uptake and vital capacity of lungs of 30-40 years old tourists skiers also statistically significant changed due to the increase in August (t = 3.70; p < 0.01), while for the period from August to January, the changes are not significant (p > 0.05).

At the beginning of the researches, the weight and height Quetelet’s index corresponded to the overweight – 23.4 kg/cm\(^2\) while in the preparation period in August it decreased to 21.5 kg/cm\(^2\) (t = 1.63; p < 0.05), and in December to 19.2 kg/cm\(^2\) (t = 3.02; p < 0.01).

At the same time the indicators of Robinson index of 30-40 years old tourists skiers in May corresponded to the level below average physical development and it was 101.9 con. units (t = 5.05; p < 0.001). Later indicators fell to 93.1 con. units (p > 0.05), and corresponded to the average level.

Thus, indicators of physical qualities and functional conditions of 30-40 years old tourists skiers varied mainly under the influence of training and competitive pressures used in the stages of the preparation period.

In order to determine the effect of physical activity as a result of ski hike of the III category of complexity analysis of the results was carried out immediately after the hike and 14 days later in order to the original data before hiking (tab. 4).

The results of the testing of 30-40 years old tourists skiers after the hike of the III category of complexity significantly deteriorated: indicators of 12 minutes run after the end of hike decreased to 297.0 m (t = 9.48; p < 0.001), 14 days later indicators returned to the original data, even with a slight increase (1,889.0 m), which indicates the presence of supercompensation phase.

The number of jumping out within 30 sec. with 10 kg has statistically decreased after the hike to 5.4 times (t = 4.95; p <0.001) in relation to testing before the hike, while after 14 days rest indicators returned to the original (p > 0.05).

The results in the number of the barbell squat with 20 kg statistically significant decreased after a hike to 10.2 times (t = 11.88; p < 0.001) relatively to the
results before the hike, and 14 days later they increased to 9.3 times (t = 15.99; p < 0.001) relatively to the results after the hike.

**Table 4**

Dynamics of indicators of 30-40 years old tourists skiers’ motive qualities before and after the hike (n=14)

<table>
<thead>
<tr>
<th>№</th>
<th>Indicators</th>
<th>30-40 years old</th>
<th>30-40 years old</th>
<th>30-40 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before hike</td>
<td>After hike</td>
<td>14 days later</td>
</tr>
<tr>
<td>1</td>
<td>12-minutes’ run, m</td>
<td>1852,0±19,08</td>
<td>1555,0±21,54</td>
<td>1889,0±18,46</td>
</tr>
<tr>
<td>2</td>
<td>Jumping out within 30 sec. with 10 kg, numbers of times</td>
<td>16,2±0,48</td>
<td>10,8±0,72</td>
<td>17,5±1,15</td>
</tr>
<tr>
<td>3</td>
<td>Barbell squat with 20 kg, numbers of times</td>
<td>33,0±0,62</td>
<td>22,8±0,60</td>
<td>42,3±1,06</td>
</tr>
<tr>
<td>4</td>
<td>Barbell squat with 50 kg, numbers of times</td>
<td>10,3±1,74</td>
<td>3,8±0,60</td>
<td>12,9±0,95</td>
</tr>
<tr>
<td>5</td>
<td>Flexion and extension arms with clap lying on the floor, numbers of times</td>
<td>40,5±0,77</td>
<td>23,4±1,09</td>
<td>43,6±1,11</td>
</tr>
<tr>
<td>6</td>
<td>Pulling up on the crossbar with a weight of 5 kg, numbers of times</td>
<td>13,1±1,23</td>
<td>4,6±0,68</td>
<td>13,5±0,92</td>
</tr>
<tr>
<td>7</td>
<td>Lifting legs hanging on the wall bars with a weight of 5 kg, numbers of times</td>
<td>29,2±0,78</td>
<td>16,1±0,72</td>
<td>32,3±0,85</td>
</tr>
</tbody>
</table>

Before the hike the results of barbell squat with 50 kg was 10.3 times, and immediately after the hike – 3.8 times (p<0.001). 14 days later the results minimally exceeded January figures of 12.9 times.

The indicators of flexion and extension arms with a clap lying on the floor, pulling up on the crossbar and lifting the legs on the wall bars with 5 kg of 30-40 years old tourists skiers statistically significant changed after the hike (p < 0.01), at the same time after 14 days of active rest, they returned to the original data.

The functional condition of 30-40 years old tourists skiers changed as well during the research under the influence of physical activity.

The oppression of functions and systems of the body, which affected the decrease in the studied parameters were after the hike.

After the hike diastolic blood pressure was increased to 14.8 mm Hg (t = 3.83; p < 0.01) and 14 days later the frequency of heart rates was increased to 4.7 beats per min⁻¹ (t = 3.94; p < 0.01) relatively to the results before hiking (tab. 5).

While to 6.9 beats per min⁻¹ (t = 3.80; p < 0.01) decreased heart rate parameters obtained 14 days later and to 16 mm Hg (t = 2.14; p < 0.05) diastolic blood pressure decreased according to the results after the hike.

The indicators of anaerobic and aerobic metabolic capacity decreased after the hike to 12.1 con. units (t = 8,15; p < 0.001) and 15.4 con. units (t = 7,40; p < 0.001),
accordingly, at the same time after active rest (14 days) the results returned to the original data, and in AMC was higher results than in prepared period.

Table 5

Dynamics of indicators of 30-40 years old tourists skiers’ functional conditions after the hike (n=14)

<table>
<thead>
<tr>
<th>№</th>
<th>Indicators</th>
<th>30-40 years old</th>
<th>30-40 years old</th>
<th>30-40 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$\bar{x}_1 \pm m_1$</td>
<td>$\bar{x}_2 \pm m_2$</td>
<td>$\bar{x}_3 \pm m_3$</td>
</tr>
<tr>
<td></td>
<td>Before hike</td>
<td>After hike</td>
<td>14 days later</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>BP systolic, mm Hg</td>
<td>113,5±2,72</td>
<td>117,2±3,68</td>
<td>112,5±2,69</td>
</tr>
<tr>
<td>2.</td>
<td>BP diastolic, mm Hg</td>
<td>63,2±1,86</td>
<td>78,0±3,38</td>
<td>62,0±2,46</td>
</tr>
<tr>
<td>3.</td>
<td>Frequency of heart rate, bpm$^{-1}$</td>
<td>80,3±1,02</td>
<td>82,5±3,15</td>
<td>75,6±0,60</td>
</tr>
<tr>
<td>4.</td>
<td>ANAMC, con. units</td>
<td>73,4±0,84</td>
<td>61,3±1,23</td>
<td>75,1±1,26</td>
</tr>
<tr>
<td>5.</td>
<td>AMC, con. units</td>
<td>171,9±1,78</td>
<td>156,5±1,08</td>
<td>178,5±1,00</td>
</tr>
<tr>
<td>6.</td>
<td>MOU, l</td>
<td>5,3±0,12</td>
<td>5,0±0,05</td>
<td>5,5±0,11</td>
</tr>
<tr>
<td>7.</td>
<td>VCL, ml</td>
<td>5050,0±69,23</td>
<td>5020,0±23,85</td>
<td>5440,0±83,08</td>
</tr>
<tr>
<td>8.</td>
<td>Quetelet’s index, kg·cm$^{-2}$</td>
<td>19,2±1,03</td>
<td>17,8±0,60</td>
<td>21,2±0,60</td>
</tr>
<tr>
<td>9.</td>
<td>Robinson's index, con. units</td>
<td>91,2±1,03</td>
<td>96,1±1,05</td>
<td>82,2±1,15</td>
</tr>
</tbody>
</table>

Ski multi-day hike slightly affected the indicators of maximal oxygen uptake and vital capacity of lungs, which decreased (p> 0.05) due to the need for more long-term process to change these indicators.

After the hike of the third category of complexity the tourists skiers’ weight decreased to 1.4 kg/cm$^2$ ($t = 1.20; p > 0.05$) compared to the period before the hike and increased to 3.4 kg/cm$^2$ ($t = 8, 90; p <0.001$) 14 days later, which confirms the weight and height Quetelet’s index.

Also, 14 days later after the hike the indicators of Robinson’s index of 30-40 years old tourists skiers decreased to 13.9 con. units ($t = 8.90; p < 0.001$).

So, it was found that ski hiking of the III category of complexity oppressed the functions of tourists skiers’ organism systems ensuring the participation in hikes, thus special physical and other training in preparation period is necessary.

**Conclusions:**

1. The comparative analysis of the results 30-40 years old tourists skiers of the experimental group received at different stages of preparation period and the results after passing ski hiking of the III category of complexity is held.

2. It was found that the developed training program for 30-40 years old tourists skiers in preparation period could effectively influence the physical preparedness, as well as all functions and systems of the organism that contributed to the successful passage of the ski sports categorized hike.

3. The effectiveness of proposed and developed training program of 30-40 years old tourists skiers to ski hiking of the III-IV category of complexity was proved in practice (ski hiking of the III category of complexity). The route was covered
completely. The timetable is maintained. All the trip participants coped with their duties and were able to overcome the physical loads on the route.

Further research will focus on the development of physical training programs in preparation period in for water, cycling and mountaineering.

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TRENDS BODYBUILDING DEVELOPMENT IN UKRAINE AND KHARKOV REGION

Abstract. Purpose: to determine the features of bodybuilding and Ukraine in Kharkiv region. Material and Methods: results conducted on the basis of archival materials and records of events, publications and other sources. Incrementally conducted research of bodybuilding Ukraine and Kharkiv from the first event to modern times. Results: bodybuilding – a sport that can be practiced at any age. This makes bodybuilding common among different population groups. Conclusions: every year in Ukraine, the growing number of athletes and their level of preparedness. Athletes of Ukraine and the Kharkiv region show good results in international competitions.

Keywords: bodybuilding protocols competitions, fitness centers, fitness, international competition results

Introduction. Bodybuilding – is one of the young sports. The first federation of bodybuilding was registered only in 1948. However the culture of a healthy proportional body arose in the antique times. In ancient Greece and Rome athletic forms were in respect about what sculptures testify of those times. Also athletic forms of Achilles and Hector were described in Homer's compositions "Iliada" and "Odyssey" [8; 13; 14]. In recent years bodybuilding develops by prompt rates in Ukraine. Opening of gyms, appearance of the opportunity to eat qualitative products and fashion on a beautiful healthy body become one of the reasons of the development. In our times each successful person has a subscription in a fitness center. In the modern world where a work is automated, a person doesn't have enough physical activity therefore a large number of people joins exercises in gyms. Domestic sportsmen represent Ukraine with pride on the international arena [11; 12].

The analysis of the development of bodybuilding in Ukraine and in the Kharkov area which strong entered the culture of the population of our country, will give the chance of forecasting of the subsequent prospects and ways of the development of this sport. The results of the researches of the famous Ukrainian experts Y. Grot and M. Oliynyk [1; 4–7] showed that bodybuilding in Kharkov and Ukraine developed unevenly. So, if some sportsmen-bodybuilders represented Ukraine at the international competitions in 1990th, in 2000 a woman from Kharkov Valentina Chepiga reaches the highest rank Miss Olympia in bodybuilding. And since 2008, the national team of Ukraine on bodybuilding adequately represents the country, taking prizes on the team superiority of the championships and European Cups and the World.
Communication of the research with scientific programs, plans, subjects.
The scientific research is executed on a subject of the Built plan of the research work in the sphere of physical culture and sport for 2011-2015 by a subject 3.7 "Methodological and organizationally methodical bases of the definition of individual norm of a physical condition of a person" (the number of the state registration is 0111U000192).

The aim of the research: to establish features of the development of bodybuilding in Kharkov and Ukraine.

Material and methods of the research: analysis of data of scientifically methodical literature, analysis and systematization of results of competitions of different levels.

Results of the research and their discussion. The first club of bodybuilding was opened by Leonid Zhabotinskyi in Ukraine [2; 3]. It took place on the first of September in 1965 at a heavy athletic arena "Spartak" in Zaporozhye. In December, 1974 the first Ukrainian athletes left out of borders of the republic on a tournament in Tallinn. Then Ukraine was presented by two athletes from Kiev and by six from Zaporozhye. S. Shaposhnikov, B. Levchenko, A. Gorshkov, A. Dovgokir achieved the best results and the team of Zaporozhye became the champion in the team superiority of the USSR [8; 13]. In the USSR bodybuilding was forbidden, as a strange, bourgeois type of culture and sport. In the 70th and 80th only functionaries of the republics of Baltic of Estonia, Latvia, Lithuania will organize a bodybuilding competition. But it is only due to the progressiveness of the leaders of these republics. There are affairs in Belarus, Ukraine, Moldova, Russia more difficult and even absolutely hopelessly. In Ukraine the first semi-official bodybuilding competitions start to be organized from 1972. In Russia and Belarus were from 1980 till 1986. The exception was made by Tyumen and Severodvinsk where brothers Koltun, Arkadiy and Evgen, organized the competition from 1972 [4–8]. In the USSR in 70th, 80th 8–10 athletes were on one inhabited locality in 500–800 thousand of the population at the best who considered themselves bodybuilders [8; 13].

There are such bodybuilding federations – UFBB, NABBA, WFF today in Ukraine. The federation of IFBB has the status of the national. At the same time, there aren’t scientifically historical researches of the development of bodybuilding in Ukraine and in the Kharkov area.

The national bodybuilding federation and fitness of Ukraine was founded in 1972 also had the name "The Commission on athletic gymnastics at the federation of weightlifting of Ukraine". In 1992 there was founded and registered the federation of bodybuilding of Ukraine, in the same year the Ukrainian federation was admitted to the structure of the International federation of bodybuilding (IFBB) in Graz (Austria) which was headed by its founder – Ben Vader since 1946. Since 2006 Raphael Santokha became the president of IFBB. From 1992 to 2008 Andrey Dolgokir (Zaporozhye), the Honored coach of Ukraine, the referee of the international category headed the Ukrainian federation (FBBU) [13; 14].

From 2008 to this time Igor Deliyev (Kiev) is the President of the federation of bodybuilding and fitness of Ukraine, the Honored worker of physical culture and
sport of Ukraine, the Honored trainer of Ukraine, the referee of the international
category, the President of the association of elite athletes of Ukraine, "Club Biola".

Sergey Otrokh (Kiev), the category till 65 kg became the first domestic world
champion on bodybuilding in 1994 in Shanghai (China) [13; 14].

Since 2001 our Federation takes part in the World Games. Oleg Protas
(Odessa) was the first participant from Federation. In 2005 only one sportswoman
took part in the World Games – Iryna Petrenko (Sumy) from the Federation of
bodybuilding of Ukraine who brought a gold medal to Ukraine. In 2009 – at the
World Games the team of the national team of Ukraine on bodybuilding and fitness
took the first general-team place (3 gold medals, 1 silver medal, and 1 bronze medal).
The federation of bodybuilding and fitness of Ukraine held two European
championships on bodybuilding, bodyfitness and fitness among women (in 2001 –
Kiev, in 2005 – Yalta); in 2004 the Federation received the status of National which
was appropriated by the order of the Statutory Board of Statistics on Physical
Training and Sports of Ukraine No. 2531 of 10.08.2004 [10; 13].

In 2006 – the European championship "Biola Pro-international" (Kiev) on
bodybuilding among men and on fitness among women was accepted the best sports
show for all history of IFBB by the International federation; in 2007 – the
organization and carrying out the first European games on bodybuilding among men
and fitness among men and women; in 2010 – the European championship on
bodybuilding (Donetsk), fitness, bodyfitness and classical bodybuilding among
juniors and a master-class. Ukraine takes the first team place.

Today 182 countries of the world are a part of the International federation of
bodybuilding (IFBB), among which the national team of Ukraine of bodybuilding
and fitness which for many years holds the leading positions in a rating of the
International federation [15; 16].

The Kharkov area – is one of the leading areas of Ukraine on the development
of bodybuilding. In 2000 – Valentina Chepiga (Kharkov) – is the only Ukrainian
sportswoman who received the title "Miss Olympia" (the highest professional title in
IFBB). In 2002 the representative of Kharkov Sergey Sabalayev wins the first place
in the European championship on bodybuilding. The representative of the junior
national team of Kharkov Alexander Kostenko takes the third place in the European
championship among juniors and veterans in Donetsk in 2010. The leading expert in
branch of bodybuilding as the senior coach of a national team of the Kharkov area,
and also the qualified athlete Alexander Kislyi extracts in fight a gold in the
European championship in 2011 and carries out the standard of the master of sports
of international class, subsequently he was invited to Kiev where he is engaged in
trainer's activity. The most titled athlete of the Kharkov area in classical bodybuilding
Gorenkov Sergey – extracts the gold in the European championship in 2012 and
became the absolute champion of the international tournament Arnold Classic [16].
Performances of bodybuilders of Ukraine at the international competitions

<table>
<thead>
<tr>
<th>Year</th>
<th>Place of carrying out competitions</th>
<th>Name of competitions</th>
<th>Name of a sportsman</th>
<th>Place</th>
<th>Weight category</th>
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<tr>
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<td>Chepiga Valentina</td>
<td>12</td>
<td>Open</td>
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<td>5</td>
<td>Till 80 kg</td>
</tr>
<tr>
<td>2000</td>
<td>The USA</td>
<td>Miss Olympia</td>
<td>Chepiga Valentina</td>
<td>1</td>
<td>Open</td>
</tr>
<tr>
<td>2001</td>
<td>Russia</td>
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<td>Till 80 kg</td>
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<td>Sabalayev Sergiy</td>
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<td>Bilous Oleksandr</td>
<td>1</td>
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<td>Bahrain, Panama</td>
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<td>3</td>
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<td>Playa de Aro, Spain</td>
<td>European Championship</td>
<td>Protsenko Sergiy</td>
<td>6</td>
<td>Till 65 kg</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beyla Balog</td>
<td>4</td>
<td>Till 80 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hes Sergiy</td>
<td>5</td>
<td>Till 80 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Boychenko Oleksandr</td>
<td>8</td>
<td>Till 85 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kuharchuk Andriy</td>
<td>3</td>
<td>Till 90 kg</td>
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<td>Kuzmin Mykhaylo</td>
<td>8</td>
<td>Till 100 kg</td>
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<tr>
<td></td>
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<td>Gorenkov Sergiy</td>
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<td>Pronenko Pavlo</td>
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</tbody>
</table>
## Conclusions:

1. Bodybuilding gains the popularity in Ukraine. The sports level of skill of Ukrainian bodybuilders improves every year. Sportsmen of Ukraine show good results at the international competitions, in particular, in general and of the Kharkov area.

2. Bodybuilding – is one of the few sports where sportsmen can compete at any age. A person can begin to be engaged in bodybuilding in thirty years and to reach good results. It does bodybuilding popular with different segments of the population.

3. The perspective direction of the development of bodybuilding in Kharkov is opening of new gyms, holdings of seminars at children's comprehensive schools, and also sports schools of the Kharkov area, relatively promoting of this sport and healthy lifestyle, and also the involvement of children and adults who wish to be engaged in bodybuilding, in sports sections of fitness in Kharkov free of charge.

It is planned to learn social-psychological and physiologic aspects of the development of bodybuilding in the subsequent researches.

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EFFICIENCY OF APPLICATION OF CARDIOTRAINING’S FACILITIES IN THE INCREASE OF THE CARDIOVASCULAR SYSTEM’S FUNCTIONAL STATE OF JUDOISTS 7–12 YEARS

Abstract. Purpose: to give the estimation of efficiency of application of cardiotraining facilities in the increase of the cardiovascular system’s functional state of young judoists 7–12 years. Materials and Methods: in research participated 60 judoists 7–12 years. There was used the method of variation pulsometre and computer program "SHVSM-integral" for the estimation of the cardiovascular system’s functional state. Results: the positive dynamics of cardiovascular system’s indexes of the judoists 7–12 years under act of cardiotraining facilities. Conclusions: the use of cardiotraining facilities in the training process of young judoists go to the reliable increase of the cardiovascular system’s functional state of their organism.

Keywords: cardiovascular system, functional state, the young judoists 7–12 years, training process, cardiotraining facilities.

Introduction. Problems of the improvement of the system of preparation of a sports reserve in different types of sports activity, including in judo continues to remain one of the most actual problems of the highest achievements in the field of sport now. It is connected with the insufficiently high level of sports results of our judoists at the largest international competitions (championships and Cups of Europe, Cups of the World, the Olympic Games) [1; 4; 12; 13].

Rather large number of researches devoted to the practical solution of the matter in which the possibility of optimization of the training process of judoists is considered at the initial stages of long-term sports preparation at the expense of increase in duration and volume of training classes, active introduction in training process of young judoists of the means of technical training corresponding to later stages of preparation, the use in training classes of young sportsmen of various exercise machines, special adaptations, etc. [2; 3; 4; 6; 10].

Despite of a certain efficiency of the specified means of optimization of the training process of young judoists, the development of new programs of the training classes including a complex of facilities allocated for the increase of the general functional condition of amateur sportsmen and, in particular the cardiovascular system of their organism substantially predetermining a level of the development of various components of the general preparedness of sportsmen is represented by rather perspective direction. According to a number of experts, facilities of cardiotraining can be rather effective in this regard [5; 7; 9; 11; 14].

The relevance and the undoubted practical importance of the presented problem became prerequisites for carrying out the real research.

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Communication of the research with scientific programs, plans, subjects. The work is a part of scientific programs of the faculty of physical training and the chair of the Olympic and professional sport and it is executed within the subject "Studying of adaptive opportunities of an organism of sportsmen at different stages of the educational-training process" (number of the state registration is 0106U000583) of the Consolidating plan of RW of the Ministry of Education and Science of Ukraine on 2010-2014.

The objective of the research: to give an assessment to the efficiency of the use of facilities of cardiotraining in the increase of a functional condition of the cardiovascular system of young judoists of 7-12 years old.

Material and methods of the research. We conducted the examination of 60 boys-judoists of 7-12 years old for a practical realization of the objective of the research which are engaged in this sport at the stages of initial (7–9 years old) and preliminary (10–12 years old) preparation. All young sportsmen were divided on the control group (15 boys at the age of 7–9 years old and 15 boys at the age of 10–12 years old) and the experimental group (15 boys at the age of 7–9 years old and 15 boys at the age of 10–12 years old).

The control group of judoists was engaged according to the traditional program of CYSS on judo for the stages of initial and preliminary basic preparation. Classes with the use of means of cardiotraining were also included in the program of training classes of judoists of the experimental group. The main contents of programs of cardiotraining were made by physical activities of an aerobic orientation lasting 5 minutes in each series. The quantity of series for one training occupation made 3–4 series with a rest interval between them of 5 minutes. The duration of cardiotrainings made 35–45 minutes, and the time for their carrying out was allocated from the general time of training classes of young judoists in the general physical preparation. The control of the pulse mode was carried out by means of special sensors-watches of the brand “Polar”.

For the purpose of an assessment of the level of a functional condition of the cardiovascular system of young sportsmen at various investigation phases the following indicators were registered at them by means of methods of a variation pulsometry and the computer program SVSM-integral: systolic blood volume (SBV, ml) and minute blood volume (MBV, l·min⁻¹), cardiac index (CI, l·min⁻¹·m⁻²), the general peripheral resistance of vessels (GPRV, dyn·s·sm⁻⁵), index of tension of regulatory mechanisms of the system of blood circulation (ITrmbc, s.u.), index of vegetative balance (IVB, s.u.), indicator of the efficiency of heart work (IFHW, s.u.), adaptation potential of the cardiovascular system (APcvs, s.u.) and general level of a functional condition of this system (LFS, points) [8].

All results received during the research were processed on the personal computer with the use of a package of the program Statistika 6.0.

Results of the research and their discussion. At the beginning of the forming experiment we carried out the comparative analysis of initial sizes of indicators of the
system of blood circulation of young sportsmen of the control and the experimental groups in the age groups of 7–9 years old and 10–12 years old (tab. 1).

It is shown that there weren’t observed reliable distinctions between representatives of the control and the experimental groups at this stage of the experiment. They noted sizes ITrmbc, IVB and cardiac index which are corresponding to physiological standard for this age and average values of an indicator of the efficiency of heart work and the general peripheral resistance of vessels, below an average – the adaptation potential of the system of blood circulation and, on the contrary, above an average – systolic and minute volumes of blood. The general level of a functional state at young sportmen of 7–9 years old and 10–12 years old, both in the control, and in the experimental groups, was considered as average, and its values fluctuated from 59,87±2,91 points in the control group of judoists of 10-12 years old till 68,42±2,36 points in the experimental group of judoists of 7-9 years old.

Table 1

<table>
<thead>
<tr>
<th>Indicators</th>
<th>7–9 years old</th>
<th>10–12 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG</td>
<td>EG</td>
<td>CG</td>
</tr>
<tr>
<td>ITrmbc, s.u.</td>
<td>153,86±20,41</td>
<td>146,54±16,31</td>
</tr>
<tr>
<td>IVB, s.u.</td>
<td>178,13±16,18</td>
<td>167,23±15,12</td>
</tr>
<tr>
<td>IFHW, s.u.</td>
<td>66,22±2,24</td>
<td>69,44±1,58</td>
</tr>
<tr>
<td>APcvs, s.u.</td>
<td>0,56±0,09</td>
<td>0,58±0,08</td>
</tr>
<tr>
<td>SBV, ml</td>
<td>40,37±0,92</td>
<td>41,4±0,64</td>
</tr>
<tr>
<td>MBV, l·min⁻¹</td>
<td>2,83±0,06</td>
<td>2,9±0,04</td>
</tr>
<tr>
<td>CI, l·min⁻¹·m²</td>
<td>2,95±0,08</td>
<td>2,81±0,07</td>
</tr>
<tr>
<td>GPRV, dyn·s·sm⁻³</td>
<td>1272,94±98,14</td>
<td>1315,2±101,4</td>
</tr>
<tr>
<td>LFS, points</td>
<td>65,84±2,28</td>
<td>68,42±2,36</td>
</tr>
</tbody>
</table>

The analysis of results of the repeated testing which was held at the end of the forming experiment allowed to establish the following.

According to the data presented in the tab. 2 reliable changes in sizes of indicators of the cardiovascular system of their organism used in the research weren’t noted at the young judoists of the control group who were engaged within the preparatory period of a year cycle of preparation according to the standard program CYSS for a stage of the initial preparation. It was possible to state only a positive tendency to decrease in the level of functional tension of regulatory mechanisms of the system of blood circulation, the increase of its adaptive opportunities and the level of a functional state in general.
Table 2

Indicators of cardiovascular system of judoists of 7-9 years control (CG) and experimental (EG) of groups at the beginning and at the end of the forming experiment, X±S

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Control group</th>
<th>Experimental group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The beginning of the research</td>
<td>The end of the research</td>
</tr>
<tr>
<td>ITrmbc, s.u.</td>
<td>153,86±20,41</td>
<td>142,77±18,94</td>
</tr>
<tr>
<td>IVB, s.u.</td>
<td>178,13±16,18</td>
<td>162,12±14,73</td>
</tr>
<tr>
<td>IFHW, s.u.</td>
<td>66,22±2,24</td>
<td>69,88±2,36</td>
</tr>
<tr>
<td>APCvs, s.u.</td>
<td>0,56±0,09</td>
<td>0,64±0,10</td>
</tr>
<tr>
<td>SBV, ml</td>
<td>40,37±0,92</td>
<td>42,16±0,96</td>
</tr>
<tr>
<td>MBV, l·min⁻¹</td>
<td>2,83±0,06</td>
<td>2,95±0,07</td>
</tr>
<tr>
<td>CI, l·min⁻¹·m⁻²</td>
<td>2,95±0,08</td>
<td>2,83±0,07</td>
</tr>
<tr>
<td>GPRV, dyn·s·sm⁻⁵</td>
<td>1272,94±98,14</td>
<td>1217,19±93,84</td>
</tr>
<tr>
<td>LFS, points</td>
<td>65,84±2,28</td>
<td>70,98±2,45</td>
</tr>
</tbody>
</table>

Note. * – p <0,05; ** – p <0,01 in comparison with indicators at the beginning of the research; • – p <0,05; •• – p <0,01 in comparison with indicators in the control group.

Positive changes of indicators of the system of blood circulation at young judoists of 7-9 years old of the experimental group were more essential, in program of training classes of which the means of cardiotraining were included. To the completion of the forming experiment they registered the reliable decrease in sizes of IVB (till 126,26±11,42 s.u.) and similar increase of sizes of SBV (44,64±0,69 ml), MBV (till 3,12±0,05 l·min⁻¹), IFHW (till 81,73±1,86 s.u.), APCvs (till 0,84±0,11 s.u.) and LFS (till 79,23±2,74 points) which was considered already as above an average.

It is important to note that more optimum were characteristic in comparison with young sportsmen of the control group, size of the majority of the studied system of blood circulation indicators to the end of the research for boys of 7-9 years old of the experimental group.

Almost similar data were obtained by us in the analysis of results of testing of young sportsmen of 10-12 years old which were engaged in judo at a stage of the specialized basic preparation (tab. 3).

Table 3
Indicators of the cardiovascular system of judoists of 10-12 years old of the control group (CG) and the experimental group (EG) of at the beginning and at the end of the forming experiment, X±S

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Control group</th>
<th>Experimental group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The beginning of the research</td>
<td>The end of the research</td>
</tr>
<tr>
<td>ITrmbc, s.u.</td>
<td>193,63±32,23</td>
<td>178,47±29,7</td>
</tr>
</tbody>
</table>
After the forming experiment the reliable changes of all indicators of the cardiovascular system of their organism weren’t noted at young sportsmen of the control group. It was possible to state only the tendency to the decrease in the level of functional tension of mechanisms of regulation of heart rhythm and the increase of their adaptive opportunities and the level of a functional condition of the system of blood circulation.

The reliable positive decrease of ITrmbc, s.u. (129,04±13,11 s.u.), IVB (135,23±13,59 s.u.) and, on the contrary, the reliable growth of sizes of IFHW (76,03±1,55 s.u.), APcvs (0,67±0,06 s.u.), SBV (49,26±0,83 ml), MBV (3,45±0,06 l·min⁻¹) and LFS (79,36±3,85 points) which was considered already as above an average was noted at young judoists of the experimental group after the forming experiment. Besides, authentically lower level of functional tension of the cardiovascular system than at young sportsmen of the control group and higher values of systolic and minute volumes of blood and the general level of a functional condition of the blood circulatory system were registered at them.

**Conclusions.** In general the results of the made experiment testified to the high efficiency of means of cardiotraining in the increase of a functional condition of young judoists of 7-12 years old at the stages of initial and preliminary basic preparation and the possibility of their use in the training process of the amateur sportsmen.

**Prospects of the further researches in this direction.** In future the studying of the efficiency of the use of means of cardiotraining in the increase of a functional condition of judoists at the stage of specialized basic preparation is planned.

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