

## Testing of control systems of high qualified handball teams in the annual training macrocycle

TYSHCHENKO VALERIA, PIPTYK PAVEL, BESSARABOVA OLENA, GALCHENKO LIA, SINYUGINA MARIA, SYDORUK ANNA

Zaporizhzhya National University, Zaporizhzhya, UKRAINE

Published online: October 31, 2017

(Accepted for publication October 07, 2017)

DOI:10.7752/jpes.2017.s4222

### Abstract:

The control system ensures the vitality of an individual approach to the sport. There were identified priority methods and tools for integrated control of highly qualified handball teams. The goal of the study was to develop control system of highly qualified handball teams in the annual training macrocycle. The analyzed factors that contribute to high-quality interconnection components control system components. It was revealed that changes in the theory and methods of training athletes' higher achievements in particular highly qualified handball players sharpened contradictions between the need for new approaches to an integrated control system, the steps in this direction and the presence of certain crisis in this area. A system for integrated control whose purpose is to define the basic priorities rationale principles selection means and ways to improve the condition of athletes' evaluation methods was developed. It proved that the implementation of a comprehensive control system in practice reduce the adverse effects of extreme training and competitive pressures, specialization and commercialization of modern sport. Without objective information about diverse fitness athletes' unthinkable management training process, that is a major factor in the further growth of sporting achievements. An Empirical Study of sets of control devices for different groups of indicators (functional status, readiness, etc.) indicated their objective, informative value and reliability. This is to ensure a certain level to assess the relevant parameters of athletes and teams of highly qualified handball on the appropriate tests and test exercises.

**Key words:** highly qualified handball players, control system, objective, method, testing

### Introduction

At the present time, the well-developed theory and methods of pedagogical control and the system of integrated control in different sports [Asadi et al, 2015]. Increased demands on the organization of measures to ensure the control and management system training process determines the need to develop new means, techniques and technologies that allow the trainer to receive and process a large amount of diverse information [Sheppard et al, 2006; Wagner et al, 2016].

It is well known, the effective management of the training process in sports is impossible without systematic monitoring of physical, technical and matches of athletes [Rampinini et al, 2009; Tyshchenko & Popovich, 2015]. Means and methods of control in sports were formed with the participation of many specialists [Rašimienė G., 2013; Briskin et al, 2016]. Though despite the research in practice pedagogical and medicobiological control of athletes at the present time, there are different methodical plans when selecting the most informative criteria and diagnostic methods.

The modern control system should be based on the postulate of the impossibility of evaluation of integrated systems of the human body on the basis of data on the individual components. Operational, current, and staged control compulsorily carried out in conditions of training and competitive activity of the athlete and should be an integral part of sports training and sports medicine [Prystupa & Tyshchenko, 2016].

**The relevance of the research topic** due to the presence of significant contradictions between the need to achieve high results and insufficiently timely, complete and quality control of the competitive activities of athletes; between the need to implement complex control state of preparedness and the lack of justification of the methodology of complex monitoring during competitive activity; between the need for complex control in assessing the condition of sports readiness of highly qualified handball players, the complexity of its implementation in practice, in the absence of modern requirements, consistent manufacturability sports and pedagogical tools.

**The goal of the study** was to develop a control system of highly qualified handball teams in the annual training macrocycle.

## Materials & methods

*Overall design* the studies were carried out during an annual training and competition macrocycle at the start and at the end of pre-season, and at the start and at the end of contest season as well. Qualified handball players of "Motor", "ZTR" teams in the age of 18-32 were involved in study. Testing procedures were performed during the competitive season. The study protocol was performed in accordance with the Declaration of Helsinki and approved by the local Institutional Review Board. All players volunteered for this study after verbal explanation of the experimental design and potential risks of the study. Oral and written informed consent was received from all participants. Exclusion criteria included history of any chronic medical conditions and use of any medication. All participants visited our laboratory once and underwent a series of anthropometric and physiological measures.

*Statistical analysis* to reveal the factor structure of the functional state of the qualified handball players, we use factor analysis of indicators using the computer program SPSS 16. Initial data for carrying out of factor analysis were indicators of qualified handball players registered for the annual macrocycle.

## Results of research

According to the statues of the construction of scientific research, we carried out testing, that was developed by the author's the control system of training and competitive activity of high qualified handball teams in the annual training macrocycles. To implement it, after the completion of the competition season 2014-2015 years by a discussion of strategic goals and the definition of the objective of the planned amount of control of the facts in the season 2015-2016 years.

Thus, in consultation with the coaching staff of two teams control procedure consisted of 7-10 points. Of these 3-5 are proposed for the current and 5 – for staged control. Facts of operational control weren't specified in advance because this type of control, according to the recommendations of basic research, should be permanent. The proposed means and methods of control have been fleshed out, and in some cases, limited and modified at the insistence of two teams' coaching staff.

The facts of the staged control of the season 2015-2016 years were minor differences that are related to the specifics of participation of teams "Motor" and "ZTR" in competitions at various levels including the European Cups. For the team "ZTR" landmark control was conducted: 23-27.06.2015 (1), 28-30.07.2015 (3), 25-29.08.2015 (5), 18-22.01.2016 and 26-28.05.2016 (10). Accordingly, the current control athletes "ZTR" allocated days: 07-12.07.2015 (2), 11-15.08.2015 (4), 19-21.09.2015 (6), 27-31.11.2015 (7) 31.03.-04/02/2016 (9). For the team "Motor" landmark monitoring was conducted: 24-28.06.2015, 30.07.-03.08.2015, 27.08.-02.09.2015, 14-18.01.2016 and 26-28.05.2016. On current control "Motor" spent days: 10-12.07.2015, 15-18.08.2015, 12-15.09. 2015 29-31.10. 2015 14-18.01.2016, 28-29.03.2016.

For the majority of the functional state of the indicators of physical, technical, mental preparedness is applied more facts current and staged control (Table 1-3). Dynamics of indicators within the pedagogical experiment to verify the training and competitive activity commands the control system was studied using ten control facts. For both teams applied for the structure identical system that contained five facts of staged control and the same amount of current. They alternated between themselves at varying intervals.

The structure and content of the functional state control means for applying complex had differences during the monitoring period (season 2015-2016.). Although the direction taken into account the requirements, which are recorded as part of our survey of highly qualified teams' trainers and pre-agreed objectives of training for "Motor" and "ZTR" teams.

Considering the component of functional readiness handball players, it was noted, that all of the tools and techniques were used in phasing control in the first, third and tenth control facts (all landmarks). The total amount of the functional conditions in these sections is 21, and characterize the functional state of cardiovascular system, autonomic balance, physical performance. Two landmarks of control occur at the beginning of the season (June and July), one – in the end (May). As for another fact staged control (August), it was recorded performance differentiation. Thus, representatives of the team "ZTR" were not interested in carrying out a number of studies, related to the study of physical performance of athletes of its team. The main motive was taken into account that the physical performance would be taken into account indirectly by information about the physical readiness. This approach has the right to use, since a large number of scientific literatures indicate the close relationship of these aspects of athletes. At the same time representatives of the team, "Motor" decided to keep the structure of the relevant testing functional training of highly qualified handball players.

Besides, in the framework of control activities related to the definition of functional handball players preparation, were conducted current control as well (July, August, September, October, March). It is clear that the objective factors led to a decrease in the number of functional training tools control with the proposed combination. However, the specifics of control and direction remain the same. Thus, for the first current control, implemented in July, selected eight indicators, 6-8 (depending on the choice of the team), in September and March – one ("ZTR") and seven ("Motor"), in October – eight.

It should be noted that representatives of the team, "Motor" in one stage and two ongoing facts of the control showed great interest indicators of functional readiness of his team of athletes rather than "ZTR". In our

opinion, this is due to minor differences in the task team for the season. "Motor" team, being the champion of Ukraine among men's teams of the Super League season 2014-2015 represented our country at the competition level of the Champions League and planned to compete on a high level for the top places. At the same time, "ZTR" – Vice-champion of these competitions, losing the fight for the trophy at the national level, was for a competition level of the EHF Cup and did not provide for the subsequent fierce competition, actually changed the priorities for the season (2015-2016).

According to the prior observation, we noticed that the coaching staff of both teams' performance functional readiness greatest interest was in the beginning of the annual training macrocycle (July-October), it means, before the beginning of the main events of the season. This gives us grounds to speak about the need to achieve quality control in fact in this period. Our control system of the functional training actually makes it possible to trace the dynamics of formation of readiness for the implementation of training and competitive loads in accordance with the level of goals that is set for the season. The alternation of control types, their structure and content provide a constant flow of information on the state of the athletes, which was taken into account in the planning of the training process.

In terms of physical preparedness planning and control of their correlation the facts were somewhat different (Table. 1).

The objective conditions of the organization of training and competitive activity resulted by seven facts control during the annual macrocycle. The five of them – in the stages (June, July, August, January and May) and the other two– made up of current control (July and August). To determine the level of physical fitness, we conducted a significant number of test items, which is associated with Polystructural preparedness. In this connection, in one of the test of facts all control tasks have not been submitted. It is done in order to avoid a complete adaptation of the organism athletes to the test loads and maintaining the priorities of the control direction.

**Table 1 Dynamics of indicators of physical readiness of highly qualified handball players in the annual macrocycle (2015–2016)**

year		2015					2016	
№ testing		1	2	3	4	5	6	7
DATE	1	27-28.06	07-08.07	26-27.07	10-11.08	21-22.08	22-23.01	26-27.05
	2	28-29.06	10-11.07	27-28.07	12-13.08	27.8-2.09	11-12.01	26-27.05
INDICATORS		Staged control	Current control	Staged control	Current control	Staged control	Current control	Current control
Counter movement Jump, s	1	32	35	38	40	42	44	–
	2	35	–	40	–	46	50	–
Squat Jump, s	1	28	30	–	35	38	41	–
	2	31	34	36	38	40	46	–
Run 30 m, s	1	4,5	–	4,3	–	4,2	4,15	4,6
	2	4,4	4,3	4,3	–	4,2	4,1	4,3
Shuttle run 100 m, s	1	25,1	–	24,2	–	–	23,3	24,4
	2	23,5	23,1	–	22,4	–	21,2	22,6
T-Test, s	1	12,6	12,1	–	10,8	10,2	9,3	11,2
	2	12,4	–	11,8	11,2	10,1	9,1	–
L-test, s	1	–	9,1	8,8	–	8,3	8,2	8,5
	2	9,1	8,5	8,2	7,8	7,5	7,8	–
Hexagon Agility Test, s	1	17,8	15,5	13,3	11,5	11,5	11,2	–
	2	15,6	–	11,2	10,8	10,5	10,3	12,2
Illinois Agility Test, s	1	25,28	–	22,25	21,44	19,5	18,26	21,3
	2	23,26	21,18	19,42	17,32	16,21	15,28	–
Dynamometry, kg	1	53	–	58	62	65	67,2	65,4
	2	57	60	–	67	68	69,5	66,2
Medicine ball throw (3 kg), m	1	6,4	–	–	–	–	10,6	8,2
	2	7,1	–	–	–	–	12,1	10,5
Running test 6 x 30 m, s	1	–	4,65	4,6	4,52	4,45	4,3	–
	2	4,5	–	4,4	4,38	4,3	4,2	–
T-test, m	1	1920	–	–	–	–	2782	–
	2	–	–	–	–	–	–	–
Test- balance, s	1	1,62	–	1,55	–	1,44	1,35	–
	2	–	1,45	–	1,35	1,27	1,23	–
Sit Up Test, quantity	1	43	–	–	–	–	–	–
	2	45	–	–	–	–	–	–

Note: 1- 1-ZTR; 2-Motor

The most voluminous facts control (stage) in the proposed system were reduced in June and January. Planning structures and content of physical fitness control carried out taking into account the desires of the teams' coaches. We anticipate that these facts to the conduct of which the largest number of tests have been involved (in a certain period) interested coaches because of their location at the beginning of the structural formations of the training and competitive processes. The preparations for the season started in June. Handball players came to the team after a relatively long break, which resulted in the need to obtain the status of the athletes and determining whether they are ready to begin specialized training practices. In January, the situation is similar, because athletes are beginning preparations for the conditional "second" part of the championship after a relatively short interval, but during which they were able to influence the factors of different nature and, accordingly, bring them out of the state of optimum readiness.

For physical readiness control, these two facts were involved in 21 ("ZTR") and 23 ("Motor") test, respectively. Other facts of physical readiness control both within the stage and current control had relatively variative structure. In addition, each of the tasks involved in the control of physical fitness instruction has been applied three or more times within a year of the macrocycle with the conservation priorities of content of physical fitness of athletes. The general trend was that the representatives of the coaching staff significantly reduced the number of tests at certain stages of the implementation of control systems, guided by their own vision of their appropriateness. The best interest is the data speed strength and coordination of athletes, which largely agrees with the majority of research on the structure of handball players' special physical readiness. In addition, planning controls in overall physical fitness held in periods of relatively long before the major competitive beginning of highly qualified handball teams. It is done to avoid overloading functional systems of athletes and promote quality training for responsible games of the Championship of Ukraine and international competitions.

The distribution of control facts of team's physical fitness has a certain offset to the beginning of the season. However, as in the case of functional training, we see the reasons for this – the need of a base qualitative foundation of physical fitness at the beginning of the annual macrocycle, before the major competition, which is necessary to solve the main problem of the annual training macrocycle. Also, significant improvement of physical fitness in athletes range, though the long competition period significantly difficult and methodologically incorrect [Platonov, 2013]. There could be only isolated cases of individual work with athletes who dropped out due to injury or disease and often require additional corrections training and competitive activity.

Note that the control of technical readiness handball players of highly qualified teams performed on several levels (Table. 2).

The first level is provided for permanent monitoring of the significant elements effectively in conditions of training and competitive activities of the coach and the appropriate urgent correction. This level we associate with the operational control, which did not provide a separate fixing performance and quality of a particular technical element in handball. The second level is provided for a thorough approach to determining the performance and quality of individual technical elements during the regular non competitive activity. It was combined by us with the facts of current and staged control during the annual training macrocycle. For this level of technical elements that are subject to control, it was significantly limited, and is determined primarily by general trends in the application of technical actions in the conditions of competitive activity.

With the help of theoretical and empirical study of means and methods, the definition of technical readiness of priorities on the part of the highly qualified teams trainers of different countries (conducted in the previous stages of research) we have limited number of indicators for control (staged and current) 14 tests. According to the objective circumstances of the implementation of training of highly qualified handball teams in the annual macrocycle implementation of technical readiness of control in terms of conventionally coincides with the control of other parties readiness (physical, mental).

A key differentiator actions for technical readiness test, compared to the physical, is that according to our assumption and thoughts controlled type fitness, coaches had other temporary indicators. Coaches level of technical elements are not interested in the early conventional structural units of the training process, and directly during output athletes (teams) to the optimum level of availability. It is seen that in the first (June-stage) and final (May-stage) the facts of the control measures (reductions) the number of the studied parameters – the smallest (3-5 points).

At the same time, we note that the technical readiness of the structure ZTR coaches found several great interest of its different aspects. For other control of the facts as a staged and current, numbers of indicators have been closer to the limit, and the entire set of indicators applied in the latter, before the main competition, staged control. These differences are dictated by the formation of preparedness structures. It is known from a large number of scientific sources, the order entry of athletes to the state of fitness involves general-preparation and especially-preparatory stage of the preparatory period of the preparation macrocycle [Platonov, 2013]. In the first one laid a functional base and general physical fitness of athletes. Further, in the preparatory specifically, when the pre-formed qualitative basis, are attached much more pronounced special training load direction, including, containing most of the training means to improve the technical and technical and tactical operations.

**Table 2 Dynamics of indicators of technical preparation of highly qualified handball players in the annual macrocycle (2015–2016)**

year		Facts (average results)						
		2015				2016		
№ testing		1	2	3	4	5	6	7
DATE	1	27-28.06	31.8-1.09	02-03.10	26-27.11	22-23.01	29-30.04	28-29.05
	2	28-29.06	03-04.09	26-27.10	01-02.12	11-12.01	02-03.05	28-29.05
INDICATORS		Staged control	Current control	Staged control	Current control	Staged control	Staged control	Staged control
Dribbling Test 30 m, s	1	–	4,5	4,4	–	4,25	4,2	–
	2	–	–	4,3	4,2	4,2	4,1	4,3
Slalom dribbling Test 30 m, s	1	6,4	–	5,8	5,6	5,4	5,3	5,5
	2	–	6,05	5,5	5,2	5,1	5,1	–
Handball zigzag-test, s	1	4,6	4,5	4,4	–	4,25	4,2	–
	2	4,5	–	4,3	4,3	4,22	4,1	4,3
Passing Handball ball – 1 min, qt.	1	24,8	–	–	–	28,2	–	25,4
	2	25,5	–	–	–	30,4	–	27,2
Accuracy Throwing-Test, points	1	–	–	22	24	25	28	23
	2	–	–	26	28	30	34	25
Speed of the passing ball Test (3 m from the wall), points	1	–	18	22	23	25	25	21
	2	–	20	24	25	26	28	23
K. Sheehan Test, points	1	18	16	20	21	25	27	–
	2	20	21	23	23	26	28	–
Complex exercise, s	1	–	45,5	44,3	43,5	43	42,5	–
	2	–	44,5	43,2	42,4	42	41,1	–
Handball throwing light test (HTLT), qt. of hits	1	–	–	13	15	16	18	–
	2	–	–	15	17	18	20	–
Complex light handball test (CLHT), s	1	–	46,2	45,1	44,3	43,3	43	–
	2	–	45,3	44,5	43,6	42,5	41,7	–
Evaluation of the rate matching level of thinking, qt.	1	–	12	14	15	17	19	–
	2	–	14	16	17	19	22	–
Simple mental reaction test in handball, qt. was made	1	–	12	15	16	18	20	–
	2	–	14	15	18	19	21	–
Complex mental reaction test, qt. of touches	1	–	16	17	19	21	23	–
	2	–	18	19	22	24	25	–
Choice reaction test in Handball, qt. was made	1	–	10	14	15	17	19	–
	2	–	12	13	17	19	20	–

**Note:** 1- 1-ZTR; 2-Motor

Mental preparation control of handball players also held as part of the general principles of certain underlying the control system of training and competitive activity of highly qualified handball teams in the annual preparation of macrocycles (Table. 3). Of the sixteen aspects of the proposed definition of the part of preparedness techniques have all been used exclusively in the first (June, Staged) test of the season 2015-2016. On all facts control (sections) in connection with a relatively limited time, requirements for individual techniques and their complex needs of training and/or competitive activities the number of applied methods and their direction was limited. However, we can analyze about respecting the permanence of mental preparedness monitoring of athletes due to the variability of the means employed. Several more emphasis on the study of mental preparedness for the proposals of teams' the coaching staff were done in the sensorimotor reactions and reaction time to stimuli of various kinds.

They are effectively determining character for many competitive situations in handball. Other applied methods have additional element to promote the achievements of the team performance. However, their value had a decisive influence on the formation of an optimum microclimate team, the establishment of the quality level of the relationship of different levels, indirectly affects the efficiency of training and competitive activities of highly qualified handball teams in the annual and especially in the long-term aspects of their interaction.

**Table 3 Dynamics of indicators of mental preparedness of highly qualified handball players in the annual macrocycle (2015–2016)**

Year		Fact (average results)							
		2015					2016		
№ testing		1	2	3	4	5	6	7	
DATE		1	23-24.06	25-27.07	31.08-2.09	02-03.11	25-26.01	05-06.04	27-29.05
		2	24-25.06	24-26.07	05-07.09	02-03.11	19-21.01	05-06.04	27-29.05
INDICATORS			Staged control	Current control	Staged control	Current control	Staged control	Staged control	Staged control
Spielberger-Hanin Test, points	1	19	–	–	36	38	–	22	
	2	13	–	–	40	42	–	19	
Methodology HAM (health, activity, mood), points	1	6,3	3,9	–	–	5,4	–	3,4	
	2	6,4	4,1	–	–	5,6	–	3,6	
Assessment of the relationship between the coach and the players, points	1	5,4	–	–	–	6,1	–	–	
	2	5,4	–	–	–	5,78	–	–	
Level of group relationship K. Sishora, points	1	7,8	–	–	–	15,3	–	–	
	2	6,8	–	–	–	11,4	–	–	
Perception of time, s	1	54,5	–	52,2	–	63,5	–	61,3	
	2	58,1	–	63,5	–	68,1	–	65,4	
Motor coordination, number of touches	1	69,21	72,44	76,22	79,52	83,34	85,82	–	
	2	72,32	75,21	78,46	82,18	85,05	88,44	–	
Visual reaction time (leading hand), s	1	0,202	0,2	0,198	0,198	0,197	0,196	–	
	2	0,207	0,206	0,205	0,204	0,202	0,201	–	
Visual reaction times (non-leading hand), s	1	0,218	–	0,213	–	0,21	0,205	–	
	2	–	0,224	0,223	0,22	0,22	0,215	–	
Auditory reaction times (leading hand), s	1	0,194	0,192	0,19	0,19	0,185	0,182	–	
	2	0,186	0,185	0,184	0,183	0,181	0,179	–	
Auditory reaction times (non-leading hand), s	1	0,212	–	0,205	0,201	0,19	0,188	–	
	2	–	0,196	0,195	–	0,193	0,19	–	
Complex sensorimotor reaction time to a light stimulus (leading hand), s	1	0,31	0,28	0,26	0,25	0,25	0,23	–	
	2	0,32	0,3	0,28	0,24	0,22	0,21	–	
Complex sensorimotor reaction time to a light stimulus (non-leading hand), s	1	0,33	0,31	0,29	0,27	0,26	0,26	–	
	2	0,35	0,33	0,3	0,28	0,26	0,25	–	
Evaluation of volume of attention, points	1	21,2	–	–	–	–	23,9	–	
	2	23,4	–	–	–	–	25,2	–	
Assessment of the distribution of attention, s	1	98,1	–	–	–	–	72,3	–	
	2	84,6	–	–	–	–	63,6	–	
Evaluation of stability of attention, s	1	122,5	–	–	–	–	101,7	–	
	2	109,8	–	–	–	–	93,3	–	
Evaluation of changing attention, points	1	47,6	–	–	–	–	68,4	–	
	2	59,2	–	–	–	–	75,1	–	

**Note:** 1- 1-ZTR; 2-Motor

## Discussion

The preparation system of highly qualified handball players should include a permanent control of the basic functional settings that provide efficient execution of technical and tactical actions in the competitions, as have been done in the specific literature [Michalsik et al, 2011a; Tyshchenko, 2015].

The ability for reflection and analysis related to the fact that handball player should play in his mind not only the tactical plan of their own actions, but also adequately reflect the actions of teammates, be able to assess their capabilities, in particular the state of preparedness, individual characteristics, technical skills and tactical thinking [Tyshchenko & Popovich, 2015]. Therefore, the plan of the training process should not only provide general and special optimization of efficiency, but also – and monitoring the development of integrated psychophysiological characteristics of individual athletes. Only in this case, a harmonious combination of operational readiness and psychophysical status of athletes is possible to achieve high results in handball. Based on that, increased attention to the diagnosis of psychophysiological state has been seen in past years, which undoubtedly is an integral part of the control system [Moesch, 2015; Sindik & Čuk, 2016].

Researchers proposed intermittent fitness test for team sports players, is an alternative to the classic continuous testing to determine the speed endurance. It is an accurate estimate V02max [Buchheit et al, 2009]. We conducted testing confirmed and possible to evaluate the current status of handball players. We have added

the data that defines the relationship between the assessment of motor skill activities and indicators of physical fitness of young handball players: explosive power of the lower limbs, speed strength, jumping up, sprinting abilities with the help of T-test [Hermassi et al, 2011]. Modern competitive activity in handball has enhanced view of physical activity interval. The match occurs discretely and is based on changes of periods of high performing actions with lower physical exertion. Repeatedly perform short intense action (counter, handling, transfer rolls, interception and the like), alternating with rest periods. All this certainly makes higher demands to the aerobic-anaerobic energy supply sources and their optimal development. The development of physical qualities during the training process takes place by specific tests, which are characteristic for handball [Tyshchenko, 2015], that reproduce the physiological requirements of the game, technical and tactical actions, and etc., which should certainly meet the requirements of data, reliability and equivalence [Wagner et al, 2014].

### Conclusions

A sufficient level of validity of a significant amount of tests and test exercises in handball, and related in structure and content of competitive sports activities. It gave reason to offer the majority of them for bringing in highly qualified handball control commands. To control the functional state of the highly qualified handball players are the main tests with the focus on a comprehensive assessment of the inclusion of the general physical performance data, the cardiovascular system, the vegetative balance. The mental preparation control of handball players is advantageously carried out by a well-known and qualitatively based methods to determine the quality of life and health, activity, mood, personality traits, personality traits, and its interaction in sport team, etc., which simplifies data interpretation and improves their efficiency accounting for corrective measures. The control of physical readiness handball players considers limiting requirements from training and competitive activity contained in high intensity and short duration narrowly specific loads aimed at the use of means and methods, which provide objective information on the indicators mostly anaerobic nature, with an emphasis on complex power-speed and power qualities, coordination abilities (various manifestations), special performance, explosive speed and power of expression of the dynamic nature. Technical preparation control of highly qualified handball players has high requirements to the automatism, sustainability, efficiency and stability of motor skills and performance in a competitive activity. The complexity of the study and set of tests of control exercises contained, in a large amount of their own actions and technical options for their application in the real world of competitive activity. The largest emphasis of technical readiness controls of the athletes were made in passing and throwing the ball.

### References:

- Asadi, A., Saez de Villarreal, E. & Arazi, H. (2015). The Effects of Plyometric Type Neuromuscular Training on Postural Control Performance of Male Team Basketball Players. *J Strength Cond Res.*, 29(7):1870-5.
- Buchheit, M., Haddad, H., Millet, G. P., Lepretre, P. M., Newton, M., & Ahmaidi, S. (2009). Cardiorespiratory and cardiac autonomic responses to 30-15 intermittent fitness test in team sport players. *J Strength Cond Res.*, 23(1), 93-100.
- Briskin, Y., Pityn, M., & Tyshchenko, V. (2016). Dynamics of changes in the functional state of qualified handballers during macrocycle. *Journal of Physical Education and Sport*, 16(1), 46.
- Hermassi, S., Chelly, M. S., Tabka, Z., Shephard, R. J., & Chamari, K. (2011). Effects of 8-week in-season upper and lower limb heavy resistance training on the peak power, throwing velocity, and sprint performance of elite male handball players. *The Journal of Strength & Conditioning Research*, 25(9), 2424-2433.
- Michalsik, L.B., Aagaard, P. & Madsen, K. (2011a) Technical activity profile and influence of body anthropometry in male elite Team Handball players. In: *European Handball Federation Scientific Conference 2011 – Science and Analytical Expertise in Handball*. Vienna: EHF. 174-179.
- Moesch, K. Psychological momentum in handball. Doctoral dissertation. *Lund university*. Sweden. 2015. 152 p.
- Platonov, V. (2013). The periodization of sport training. The general theory and its practical application [in Russian]. Kiev: *Olymp. Literature*, 624.
- Prystupa Y. & Tyshchenko V. Condition of control problems in training and competitive activities in the system of training highly qualified teams in handball. *Physical activity health and sport*. 2016. №4(26). P. 39-49.
- Rampinini, E., Impellizzeri, FM., Castagna, C., Coutts, A. J., & Wisloff, U. (2009). Technical performance during soccer matches of the Italian Serie A league: effect of fatigue and competitive level. *J Sci Med Sport*, 12(1), 227-233.
- Rašimienė, G. (2013) Optimization of coaching semi-professional female handball team: case study doctoral dissertation, *Lithuanian Sports University*, Kaunas, 58 p.
- Sheppard, JM. & Young, WB. (2006). Agility literature review: classifications, training and testing. *J Sports Sci.*;24(9): 919-32.
- Sindik, J. & Čuk, A. (2016) Psychological characteristics and traits in male handball players – optimism, athlete engagement and mental energy. *Sport SPA*. Vol. 13, Issue 1: 5-11.

- Souhail, H., Mourad, F., Mohamed, SC., & Abdelkrim, B. (2011). Relationship between agility T-test and physical fitness measures as indicators of performance in elite adolescent handball players. *Pedagogics, Psychology, Medical-Biological Problems of Physical Training and Sports*, (5). 125-131.
- Tyshchenko, V. & Popovich, O. (2015). Control of general and special physical preparedness by qualified handballers. *Journal of Physical Education and Sport*, 15(2), 287.
- Tyshchenko, V. O. (2015). Control over training process as the basis of successful realization of elite handball teams' training. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 19(6), 35-40.
- Wagner, H., Finkenzeller, T., Würth, S. & Duvillard, S. (2014) Individual and Team Performance in Team-Handball: A Review. *Journal of Sports Science and Medicine*. 13, 808-816.
- Wagner, H., Orwat, M., Hinz, M., Pfusterschmied, J., Bacharach, DW., von Duvillard, SP. & Müller, E. (2016). Testing Game-Based Performance in Team-Handball. *J Strength Cond Res*. 30(10):2794-801.