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Indicators functional condition of sportsmen-handball player

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Purpose: *to investigate the functional state of the female handball players to develop a comprehensive methodology for determining the prospects of athletes in a chosen sport.*

Material & Methods: *the complex of kinematic characteristics was studied among girls of different age (15–16 years and 17–18 years) and sportsmanship, in all 45 persons, according to our method of measuring the training activities effect, as well as sensorimotor responses to auditory and visual stimuli, the air-flow rate , accuracy of a given muscle force were determined.*

Results: *in the process of studying the fitness and functional training changes of athletes of different ages, we discovered that the professional development increases the athlete capability in the performance of complex physical actions, which provides a set of actuators of various anatomical and physiological systems aimed at achieving the desired final result.*

Conclusions: *the functional indicators change is due to the general regularities of growth and development and the specific influence training and sport activities. The obtained data can be used to refine the muscle loading at different levels of functional fitness, motor activity, morpho-functional capabilities of the organism, and the athlete health state.*

Keywords: *handball, functional state, pace, accuracy of movements, sensorimotor response, the air-flow speed, dosing accuracy of muscular effort*.

Introduction

The competitive activity of handball player requires certain skills and abilities. To mastering of techniques and tactical actions of an athlete requires special physical training. High-speed movement without or with a ball, jumps, powerful throws, large-amplitude motions, long-distance running with variable speed and intensity during the game require the active cooperation of all physical qualities [2; 3].

The demonstration of force is dynamic, and often needs to be used as high-speed force (throw, handing and keeping of the ball), and explosive force (jump, spurt), i.e. strength endurance in handball-player preparedness is essential [6].

Handball requires a maximum demonstration of all speed abilities components: speed of simple and complex reactions, single movements, and the pace (rate) of movements. Play activity is characterized by choosing the reaction to a moving object, the repeated starting speed-up with the change of direction of the ball, the other players, replacement of some techniques and actions others [7].

To master techniques handball player requires a certain flexibility and agility, which reveal themselves in the ability to perform complex techniques timely and efficiently during the game under a sudden changing situation [4].

In the implementation of competitive activity, physiological qualities and properties of the individual handball player are of great importance. Special attention is paid to the processes of information reception, processing, storage and transmission. For proper solution of tactical tasks, players must have information about the partners' location at the court, the ball location, possible opposition of the rival, coach and partners' signals, etc. [5; 8].

Of a great value in handball are the characteristics of visual and auditory perception, connected with remote-dynamic peculiarities of the perception object, with the ability to estimate the distance to the flying ball, moving partner, their location within the playing area [8].

The specific features of the activity form of the complex perception of a handball player, which is based on a fine differentiation of stimuli coming from different analyzers: muscular-skeletal, vestibular, visual, auditory, tactile. Such specialized perception is available to high-standing players [2].

In the conditions of the intensity increase of the game actions and the time shortage psychological resistance is very important, as it provides a data processing, and prediction of further course of the situation. The player instantly analyzes several options and applies the one that, in his opinion, is the most consistent to the situation. Generally athletes choose an

option from a number of known and previously studied, in this case operational thinking includes elements of creative thinking [10].

The implementation of competitive activity requires certain functionality of an athlete, and appropriate aerobic-anaerobic energy supply. However, the level of special endurance is determined not only by energy supply system. It depends on the activity of the central nervous system, the endocrine system, the state of the musculoskeletal system, intramuscular specific changes [3].

Highly qualified athletes perform a large number of technical and tactical actions with the ball and without it. Both women and men have higher rates of maximum oxygen consumption, but at the same frequency of heart rate, energy consumption of male handball players is higher than of female handball players [6]. Athletes with more marked aerobic abilities make more work during the game. There are no significant differences in the magnitude of physiological changes among handball players of different game specialization. This shows that in the modern handball there are same high requirements for functional training to all players[9].

The purpose of the research

To investigate the functional state of the female handball players to develop a comprehensive methodology for determining the prospects of athletes in the chosen sport.

Material and Methods of research

University students and students of the Higher School of Physical Education, girls, were examined: 15–16 years – the second sports category, 25 people aged 17–18 – the first category and candidates for master of sports – 20 people. We have developed a test measuring the training activities effect based on tapping-test which determines the set of kinematic characteristics according to the pace and accuracy of movements (total and single), as well as characterizes some physical properties. Measuring of the training activities effect was carried out in three periods – 15 sonds, 60 sonds, 15 sonds. Athletes were asked to hit targets in the center, at a distance of 30 cm, as quickly and accurately as possible. The results were recorded automatically and processed by variational statistics method with the reliability of $p<0,05$. The technique was published in the Slobozhanskiy herald of the scientific and sport, 2015, № 4, S. 19–25 [1].

Results of the research and their discussion

Test indicators of training activities effect among the group of girls aged 15–16 are shown in Table 1. Movement pace in the first period of the test was 29±1,56 shots with total score of 222±6,03 points and accuracy of 7.65±0.09 points. The difference between the minimum and maximum values were significant in pace from 21 to 42 shots, total score from 160 to 262, accuracy of actions from 6.3 to 9.3 points. In the second-period, based on 15, i. e. bringing the indicators to a common observation time, pace was 32±2.06 shots, an increase by 3 or 10.3%, with a minimum amount – 21.5 and the maximum – 49,25 shots; total score 233±6,42 increased by 11% or 5; with a minimum amount – 131.5 points, and the maximum – 319 points; accuracy of movements – 7.28±0.37 points slightly decreased by 0.37 points, at the minimum value was equal to 4.38 points, i. e. decrease by 1.92 points, at the maximum amount – 9.38 points, an increase of 0.35 points. In the third period of the test pace was 30±1,71 shots on one shot more than in the first period and on 2 shots less than in the sond; total score was equal to 225±6,32, with a minimum indicator – 148, and the maximum – 287; accuracy of movements was 7.50±0.31 points, compared with the first period it was less on 0.15% or 2 points and with the second- more on 0.22 or 3.02% points. The total indicator for the three periods in the pace – 31,1±1,84 shots, the total score – 229.8, accuracy of movements – 7,41±0,33 points. In this group during the study of movement pace was maintained at a high level (29–32 shots) and satisfactory accuracy of movements (7,28–7,65 points).

Indicators of sensorimotor response to sound – 0.198±0.007 s, with a minimum reaction time of 0.173 s and a maximum reaction time – 0.254 s; to a visual stimulus – 0,230 ± 0,006, with minimum reaction time – 0.193 s and the maximum – 0.259 s.

The air-flow rate on inspiration, on average was 4,01±0,71 $l \cdot s^{-1}$, at the maximum – 5.0 $l \cdot s^{-1}$ and the minimum – 2.7 $l \cdot s^{-1}$; on exhalation, on the average – 4,45±0,192 $l \cdot s^{-1}$, maximum – 5.6 $l \cdot s^{-1}$, the minimum – 3.0 $l \cdot s^{-1}$.

Performing accuracy of a given muscle effect was 20 kg with an error for the right and left hands, respectively, – 0.89 ± 0.19 kg and 1.31±0.35 kg at the minimum value – 0.15 kg and 0.32 kg and the maximum – 2.50 kg and 4.75 kg.

In the group of girls aged 17–18 (Table 2) while measuring the training activities effect in the first period, pace of movement was 28±0,817 shots, total score – 249±4.92, accuracy of shooting the target 8,89±0,13 points. The best result was with the pace of 34 shots, the total score of 314, the accuracy – 9.26 points; minimum – pace of 23 total score – 176, accuracy – 7.65 points. In the secondperiod pace was 30 shots, total score – 263, and accuracy – 8.8 points. Compared to the first period of the pace was increased to 2 shots or by 7.1%, the total score – to 5.6%, the accuracy was practically not changed. Maximum result: pace – 37 strokes, total score – 351, accuracy – 9.5 points; minimum: pace – 25 strokes, total score – 200, and accuracy – 8.0 points. In the third period, pace movements increased to 32 ± 1.19 shots, total score – 271, accuracy – 8.46 points. At the maximum rate: pace – 40 shots, total score – 384, accuracy – 8,46 points; and a minimum rate: the pace – 25 shots, the total score – 180, accuracy – 7.2 points. In the third period, compared to the first one the pace increased by 14.2%, the total score – 8.8%, the accuracy of movements decreased by 0.43 points, i.e. practically remained at the same level, but compared to the secondperiod the pace increased by 6.6%, total score by 3%, accuracy decreased by 0.34 points.

On average, the following results within all 3 periods were obtained: pace – 31±0.816 shots, total score – 262±6,546, accuracy – 8,7±0,10 points, while the maximum rate: pace of 37 shots, total score – 340, accuracy – 9.4 points and the minimum rate: pace – 24 shots, total score – 185, accuracy – 7.7 points.

The reaction time in the sensorimotor stimuli was: to sound – 0,186±0,005 s with the best time – 0.154 s and the worst reaction – 0.226 s; to visual – 0,196±0,006 s with minimum re-

Table 1

Research results of female handball players aged 15–16

Static indicators			M±m	M_{max}	M_{min}	G	C
Measuring of the training activities effect	The first period	Pace	29±1,56	42	21	6,05	20,86
		Total score	222±6,03	262	160	23,39	17,24
		Accuracy	7,65±0,09	9,03	6,3	0,34	14,37
	The second period	Pace	128±8,24 (32±2,06)	197 (49,25)	86 (21,5)	6,99	24,99
		Total score	932±25,70 (233±6,42)	1276 (319)	526 (131,5)	21,61	23,19
		Accuracy	7,28±0,37	9,38	4,38	1,44	19,54
	The third period	Pace	30±1,71	46	23	6,63	22,10
		Total score	225±6,32	287	148	20,05	17,80
		Accuracy	7,50±0,31	8,83	4,63	1,21	16,67
	Total	Pace	187±11,06 (31,1±1,84)	281 (46,8)	132 (22)	6,94	22,48
		Total score	1379±37,53 (229,8±6,25)	1755 (292,5)	919 (153)	24,09	17,47
		Accuracy	7,41±0,33	9,21	4,71	1,30	17,50
Tests	EMR	Sound	0,198±0,007	0,254	0,173	0,023	1,172
		Visual	0,230±0,006	0,259	0,193	0,019	2,938
	PT	Inspiration	4,01±0,171	5,0	2,7	0,66	6,53
		Exhalation	4,55±0,192	5,6	3,0	0,75	6,88
	Dmrev.	right	0,89±0,19	2,50	0,15	0,72	2,21
		left	1,31±0,35	4,75	0,32	1,37	3,45

Note. *The data given in parentheses is of a single time record of 15 sonds, in particular the pace in the secondperiod was 128:4=32 shots, total – 187:6=31.1 shots.*

Table 2

Research results of female handball players aged 17–18

Static indicators			M±m	M_{max}	M_{min}	G	C
Measuring of the training activities effect	The first period	Pace	28±0,817	34	23	5,17	11,28
		Total score	249±4,92	314	176	19,07	7,66
		Accuracy	8,89±0,13	9,26	7,65	0,52	5,36
	The second period	Pace	120±3,34 (30±0,83)	148 (37)	100 (25)	8,97	10,81
		Total score	1052±25,77 (263±6,44)	1406 (351)	800 (200)	10,0	9,51
		Accuracy	8,8±0,12	9,5	8,0	0,46	5,24
	The third period	Pace	32±1,19	40	25	4,61	14,11
		Total score	271±8,10	384	180	21,41	11,59
		Accuracy	8,46±0,18	9,6	7,2	0,69	8,23
	Total	Pace	181±4,9 (31±0,816)	221 (37)	155 (24)	9,02	10,51
		Total score	1573±39,28 (262±6,546)	2040 (340)	1110 (185)	15,24	9,69
		Accuracy	8,7±0,10	9,4	7,7	0,40	4,64
Tests	EMR	Sound	0,168±0,005	0,226	0,154	0,021	1,112
		Visual	0,196±0,006	0,257	0,171	0,024	1,264
	PT	Inspiration	4,0±0,26	5,5	3,0	1,008	7,26
		Exhalation	4,5±0,18	5,5	3,1	0,69	5,37
	Dmrev.	right	1,2±0,16	2,5	0,3	0,63	2,83
		left	1,3±0,22	3,1	0,2	0,84	4,29

action time – 0.171 s, maximum – 0.257 s.

The air-flow rate on inspiration averaged 4,0±0,26 $l \cdot s^{-1}$, maximum – 5.5 $l \cdot s^{-1}$, the minimum – 3.0 $l \cdot s^{-1}$ and on exhalation averaged – 4,5±0,18 $l \cdot s^{-1}$, maximum – 5.5 $l \cdot s^{-1}$, the minimum – 3.1 $l \cdot s^{-1}$.

Accuracy of performing a given muscle effect was observed with an error for the right hand, on average – 1,2±0,16 kg, maximum – 2.5 kg, minimum – 0.3 kg; for the left hand on average – 1,3±0,22 kg, maximum – 3.1 kg, minimum – 0.2 kg.

When comparing the data obtained in the age groups of 15–16 years and 17–18 years, one should note that the pace in the younger group in the first and second test periods were better on 3.5% and 6.6%, and in the third period worse on 6.6%, but the total score and the accuracy of movements were better in the older group, respectively, in the first test period 12.1% and 16.2%, in the second – by 12.8% and 20.8% in the third – by 20.4% and 12.8%, on average within all periods – 13.9% and 17.4%.

The reaction rate for sound and visual stimuli in older athletes was better on 6.45% and 7.3%, respectively.

The air-flow rate on the inspiration and exhalation at the average and maximum results was almost the same, but the difference between the maximum and minimum values were lower in athletes aged 17–18, than those of 15–16 years.

Accuracy of performing a given muscle effect was almost the same in both age groups, the arithmetic average error is less in the older group.

While researching the training activities effect we obtained the results that characterize the change of fitness and functional training of female athletes of different ages. With age increase, the strength and lability level of the musculoskeletal system are improved and thus there is an active formation of the coordination mechanisms and motor skills.

The complex of actuators of various anatomical and physiological systems provides the performance of motor actions in the minimum period of time and, therefore, aims at achieving the desired final result, in which a large role is played by touch regulation mechanisms that activate and carry out the correction of regulatory and executive functions.

In the course of systematic trainings and improvement of athlete professional skill of performing complex motor acts that are adaptive and aim at saving a balance between the body and the environment. Different requirements to the functional state of the physiological systems contribute to the creation of new coordination relationships that meet certain conditions.

Conclusions

The examination of female handball players of two age groups has established that in the group of athletes aged 17–18 the reaction rate, accuracy of performing actions and efficiency of action were better and indicators more stable than in the group aged 15–16. Consequently, indicators of sensorimotor reactions, pace, total score and accuracy of movements, as well as air-flow rate, accuracy of performing a given muscle effect can characterize the fitness of an athlete and be used at the selection stages. Improving of psycho-physiological characteristics is due to the general regularities of growth and development and the specific influence of training and sport activities.

The research results can be used to refine the physical activity at different levels of functional fitness, motor activity, morphological and functional capacity of the organism, the athlete health atate.

Prospects for further research

Prospects are to develop criteria and methodology for determining the prospects of an athlete in a chosen sport, based on the comparative analysis of the functional state of the survey of athletes of different age groups and kinds of sports.

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The degree of parental awareness of using means of physical rehabilitation on the frequently ill children

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Purpose: *to establish the degree of parental awareness of using means of physical rehabilitation on the frequently ill children with acute respiratory viral infections.*

Material & Methods: *analysis of scientific and methodological literature, surveys and questionnaires.*

Results: *the research involved 54 families with the frequently ill children. The paper characterizes and establishes the degree of parental awareness in the sphere of physical rehabilitation of the frequently ill children, determines the level of parental interest in cooperation, presents the plan of seminars with parents.*

Conclusions: *increasing the degree of parental awareness by studying and explaining is a prerequisite to achieve high effectiveness in health recovery process of the frequently ill children.*

Keywords: *children who are sick, parental awareness, physical rehabilitation.*

Introduction

Nowadays the priority task of our country is child care, one of the directions of which is the decrease in number of incidence among children and the assistance to the harmonious development of a child. Diseases of the respiratory system among which respiratory diseases prevail, take first place on the last statistics in the structure of incidence of children [6; 8–10].

Children, at whom the quantity of respiratory diseases for a year equals or exceeds 4 times, are referred to the category of often ill [1; 7]. Frequent and long diseases promote the emergence of the pathological process in the growing organism which can serve as a cause of infringement of processes of the growth and development, ripening of functional systems, that significantly reduces the quality of life not only of a child, but also of his parents. O. V. Peshkova notes that children who are often ill with ARVI even when transferring a disease in a light form, functions of central nervous, cardiovascular, respiratory, muscular and other systems decrease in much bigger measure, than at children who seldom are ill [4]. V. Yu. Albitsky and co-authors specify that the pathological process and the morphofunctional deviation reduce the resistance of a children's organism which conducts to the repeated episodes of an illness [1]. A. Yu. Polyanina with co-authors notes that to take that fact at the rate of social and economic cogency that serious somatic and neurologic complications which treatment is a difficult task, quite often develop after the postponed infections, then there a special value of rehabilitation of such children becomes clear [5].

In recent years, the considerable attention is paid to children who are ill frequent and lasted [3], namely concerning the correction of physical state and the organization of physical education (L. A. Solovyova 2014, L. V. Kozibroda of 2006, O. M. Myatyga, 2004); features of the development of mental functions (A. V. Katasonova, 2006, O. V. Vladimirov, 2012); prevention and improvements (K. L. Vakhova, 2004, V. O. Ivanov, 2007, M. G. Mikhaylova, 2009), concerning the priority application of separate means of rehabilitation: use of medical physical culture (O. V. Peshkova, 2015), applications of reflexotherapy (V. V. Polunina, 2008), carrying out balneotherapy (D. Kh. Balalayeva, 2010), aromatherapy (O. V. Tolkacheva, 2009, T. Ye. Khristova, 2012, O. M. Konov with co-authors, 2014), hydrorehabilitations (O. S. Kozlovaya, 2015), but other. Multi-factor productivity of influence on the correction of deviations in a state of health gives uncommon opportunities to predict a decrease in indicators of number of diseases on respiratory and viral infections among the children's population or at least the decrease in aggression of the course of an illness. The position of parents is one of the factors which influence the process of implementation of the developed programs in our opinion. To the large extent it depends on awareness degree in the sphere of the offered program.

Communication of the research with scientific programs, plans, subjects

The work is performed according to the plan of the research work of NNIFK of Sumy state pedagogical university of A. S. Makarenko of MES of Ukraine for 2011–2015 by the subject «Increases of the level of health and physical preparedness of different groups of the population by means of physical culture» (number of the state registration is 0111U005736) and by the subject «Theoretico-methodological and organizationally-methodical problems of health and physical rehabilitation and correctional pedagogics» (number of the state registration is 0107U002826) for 2015–2021.

The purpose of the research

To establish the degree of awareness of parents concerning the application of means of physical rehabilitation for children who are often ill with acute respiratory and viral infections.

Research tasks:

1. To develop the questionnaire for the definition of degree of