

RESEARCH OF INDEXES OF PHYSICAL DEVELOPMENT, PHYSICAL PREPAREDNESS AND FUNCTIONAL STATE OF STUDENTS AGED 10-11 YEARS UNDER THE INFLUENCE OF ENGAGEMENT IN RUGBY-5

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Annotation. Height, weight, speed, adroitness, force and speed-power internalss, is investigated, indexes of the functional state of the cardiovascular system of students aged 10-11 years which taking the lessons of physical culture of rugby-5. In research took part 52 students of 5th forms of the Kharkiv gymnasium 172. Expediency of the use of rugby-5 engagement physical culture at secondary school is grounded. The basic indexes of physical preparedness of schoolchildren of 10-11 years are considered. Dependence of indexes of physical development is established, physical preparedness and functional state of the cardiovascular system of organism of pupils under impact of taking up rugby-5. We prove the equivalence game Rugby-5 from other sports included in the school curriculum and adaptability of the sport to the physical performance of students aged 10-12 years.

Keywords: rugby, schoolchildren, physical culture, preparedness, development, sporting game.

Introduction

Modern state of educational system's development in secondary school requires application of physical loads and outdoor game, which would be adequate to the pupils' state of health. The existing requirements to reconstruction of academic plan on physical culture in school are out of date and need to be reviewed not only from the point of view of normative tests and physical loads but also from the point of approach to selection of sports activity kinds. In the opinion of modern scientists (V.M. Platonov, 1997 [6]; L.P. Matvieyev, 2004 [3]; T.Yu. Krutsevych 2003 [2]; H.B. Москаленко, 1993 [5]; N.M. Terentyeva, [8]; B.M. Shyan, [11]; L.P. Sergiyenko, [9]; O.M. Khudoley, 2008 [10] et al.) in secondary school it is necessary to implement adapting environment for physical activity, in which pupil can chose a kind of sports by his wish.

With implementing of adequate outdoor games into academic process on physical culture in secondary school it is necessary to rest on simplified kinds of activity, which have already been adapted for children's world vision, thinking and physical state. Rugby-5, or rugby for children, is just such kind of sports. This kind of sports is regarded as outdoor game, it is contactless, full of motion and zonal. The main advantage of rugby-5 is synchronization of a child's movements with his heart beat frequency. After fulfilling a pass, sportsman has time for rest. Time periods of physical activity with fulfillment of technical element and during rest are equal, i.e. sportsman has time for rehabilitation. This is an important factor in modern world, when children have weak health and are bent to heart diseases. After rugby-5 trainings pupils spend much less time for forces' restoration and stat the next lesson without physical tiredness and overloading. Thus, implementation of rugby-5 in modern process of pupils' physical education is demanded and urgent and requires to have developed system of informational and methodic provision.

The connection of the conducted scientific research with topic "Scientific-methodic principles of application of information technologies for preparation of physical culture and sports specialists" (state registration number 0113U001207) is in developing of informational-methodic provision of rugby's-5 implementation in the system of physical education and sports' preparation.

Purpose, tasks of the work, material and methods

The purpose of the work is to study changes in physical level, physical preparedness and functional state of 10-11 years old pupils, who are trained rugby-5 at physical culture classes. In order to reach our targets, we should have to solve the following tasks: to ground purposefulness of rugby's-5 implementation in school physical culture program; to study rugby's-5 influence on physical level, physical preparedness and functional state of cardio-vascular system of 5-form pupils; to establish interconnection of the researched indicators

The methods of the research: theoretical analysis and generalization of literature resources on problem of rugby's introduction into school program of physical culture, method of informational simulation, which was used for creation of information-methodic complex's provision of rugby-5; pedagogic observation of physical culture educational process in secondary school, which was carried out in order to find the most popular among pupils kinds of sports; from January to February 2012 - pedagogic experiment during which 5 forms pupils learned rugby-5 game; control testing at the beginning of the experiment and after its end (pressing ups, chin ups, rising of torso in sitting position from lying one during 1 minute, 30 meters run, shuttle run 4x9 m, long jumps from the spot, forward torso bending from sitting position); methods of mathematical statistics, which helped to generalize the obtained results.

Results of the research

Analysis of literature sources and pedagogical observation's data generalization witness that rugby-5 belongs to outdoor games and is characterized by prevailing of quickness's, flexibility's and speed-power abilities' development. Development of these qualities in the age of 10-11 and 12-13 years old has been physiologically grounded. For example in the works by O.M. Khudoliy (2008) it is pointed that quickness is developed the most successfully in young and middle school age [10].

Authors witness that it is purposeful to develop quickness by means of physical education, which are oriented on increasing of movements' frequency. Duration of exercise for quickness for children and teen-agers shall be within 4-6 seconds [9].

Researches, directed on determination of rest intervals between exercises for quickness are of special interest [11]. At trainings of middle school age children for training of quickness, with repeated fulfillment of exercises relatively short rest intervals of approximately 2 minutes are purposeful, and with using of them more intensive exercises are possible. However, rest intervals must not be of the same duration like in any other work. They should be various in order to avoid stabilization of levels in quickness's and speed endurance's development, connected with organism's adapting to monotonous, repeated work.

Researches, containing foundations of methodic recommendations for organization of trainings are of special interest [9]. Warming up during minimum 15-20 minutes is recommended before fulfilling of exercises for quickness.

Dexterity is trained in the process of learning and mastering of many different motion skills and abilities. N.M. Terentyeva points that as far as dexterity determines the quickness of movements' skills mastering, i.e. the better is dexterity the quicker technique of physical exercises will improve, that is why, dexterity training can be conducted with methods of movements' training [8].

T.Yu. Krutsevych writes that dexterity and coordination of movements can be the most easily developed in middle school age. Further there can be a break in development of dexterity if not to fulfill special exercises for its improvement systematically. Young school age is the most favorable period for development of dexterity not only of pupils but for the whole their future life [2].

In middle school age flexibility is connected with other physical abilities and influences on their level/ Researches, which were fulfilled by L.P. Sergiyenko, permit to speak about efficiency of such exercises with selective training of flexibility. The author also studied different variants of dosed loads and determined age periods of the most effective development of this motion quality for school age children [7].

In the works by A.A. Martyrosian it is pointed that rugby-7 and rugby-5 are based on development of quickness, dexterity and speed-power preparedness [4].

For solution of the tasks of our research we fulfilled complex testing of pupils of control (n=30) and experimental (n=32) groups. Comparison of the obtained data of physical preparedness of the examined pupils at the beginning of experiments with normative for age period of 10-12 years old witnesses about fulfillment of tests for quickness and dexterity at higher than middle level (10-12%) and speed-power and power exercises at a little lower than middle level (8-10%). Selective method of control and experimental groups' completing by physical preparedness, which was carried out by occasional method, permits to affirm the correspondence of the examined pupils to general population of pupils and reflects mean level of physical preparedness of the examined pupils.

We have established interconnection between long jump from the spot and torso bending ($p < 0.05$), that is explained by same orientation of these exercises. Also we have established dependence of 30 m run's indicators and shuttle 4x9 m run's indicators ($p < 0.05$), that can be interpreted as indicators, having at their base fulfillment of distance run (see table 1).

Table 1.

Dependences of indicators of 5 forms pupils' physical preparedness

Indicators	Height (m)	Weight (kg)	30 m run (sec)	Long jump from the spot (cm)	Forward torso bent (cm)	Shuttle run 4x9 m (sec)
Height (m)	1					
Weight (kg)	0.38	1				
30 m run (sec)	-0.30	-0.23	1			
Long jump from the spot (cm)	0.28	0.16	-0.22	1		
Forward torso bent (cm)	0.35	0.08	-0.19	0.50	1	
Shuttle run 4x9 m (sec)	-0.24	-0.19	0.32	0.03	-0.07	1

* for n=60 with critical value $r \geq 0.25$, $p > 0.05$; $r \geq 0.36$, $p > 0.01$.

The most brightly expressed dependence is observed between long jump and forward torso bent ($p < 0.01$), that is explained by power orientation of fulfillment of these exercises and by anthropometric factor, i.e., pupils, who have long upper and lower limbs, have more powerful lever of pushing themselves with jumping and with forward torso bent. Concerning other indicators no confident dependences were observed. The obtained by us data confirm research results of a number of scientists [1, 3].

Pedagogical experiment was carried out in January-February 2012. Control group pupils, represented by 5-A form, trained basketball at physical culture classes. The pupils of experimental group, represented by 5- B form were trained rugby-5. After experiment we also analyzed indicators of control and experimental groups' pupils and

established correlation dependences. It was found that there were no confident differences in indicators of physical preparedness and physical level between pupils, who played basketball and pupils, who practiced rugby-5 ($p > 0.05$).

Table 2.

Statistical analysis of physical level and physical preparedness indicators of 5 form pupils after experiment

Indicators	Control group (n=30)	Experimental group (n=32)	t	P(t)
	$\bar{X} \pm m$	$\bar{X} \pm m$		
Height (m)	1.38±0.01	1.43±0.01	0.89	>0.05
Weight (kg)	37±0.82	38±0/77	0.09	>0.05
30 m run (sec)	4.5±0.07	4.1±0.09	1.23	>0.05
Long jump from the spot (cm)	11±0.11	10.6±0.10	1.25	>0.05
Forward torso bent (cm)	1.74±0.01	1.77±0.02	1.77	>0.05
Shuttle run 4x9 m (sec)	10.9±0.87	10.2±0.69	1.62	>0.05

* t-limit value of degree of freedom (k = 60) equals to 2,00 with $p < 0.05$.

It witnesses that the level of physical load is approximately equal and adequate to physical level and preparedness of children both in basketball in rugby-5. Comparative analysis of sport results' increment in control and experimental group points, that increment's dynamics of all studied indicators are steady.

The fulfilled after experiment correlation analysis showed to some extent closer dependences (see table 3) between long jump from spot and torso bent ($p < 0.01$), 30 m run and shuttle 4x9 m ($p < 0.01$), and influence of height-weight indicators on pupils physical level.

Table 3.

Dependences of indicators of 5 forms pupils' physical preparedness under influence of rugby-5 trainings

Indicators	Height (m)	Weight (kg)	30 m run (sec)	Long jump from the spot (cm)	Forward torso bent (cm)	Shuttle run 4x9 m (sec)
Height (m)	1					
Weight (kg)	0.38	1				
30 m run (sec)	-0.30	-0.23	1			
Long jump from the spot (cm)	0.28	0.16	-0.22	1		
Forward torso bent (cm)	0.35	0.08	-0.19	0.50	1	
Shuttle run 4x9 m (sec)	-0.24	-0.19	0.52	0.03	-0.07	1

* for n=60 with critical value $r \geq 0.25$, $p > 0.05$; $r \geq 0.36$, $p > 0.01$.

Thus, the fulfilled analysis of physical level and physical preparedness indicators of 5-form pupils, who trained rugby-5, witnesses about uncertainty of differences from the same indicators of 5-form pupils, who trained basketball, football or gymnastics. It points at equal significance of rugby-5 with other kinds of sports, included in school educational program and at the fact that this kind of sports is adapted to physical indicators of 10-12 years old pupils. The obtained results permit to recommend rugby-5 as part of pupils' physical education program. Besides, rugby -5 has special advantages – equal intervals of physical load and rest. A child has opportunity to have rest, to rehabilitate.

In order to find out the level of cardio-vascular system workability's rehabilitation we carried out pulse metering before physical culture lesson, after physical load and after the lesson. Determination of heart beat frequency indicators of both control and experimental groups' children was fulfilled at every physical culture lesson. The results were entered in special register and then registered in computer data base. Generalized analysis of heart beat frequency (HBF) indicators of every separate pupil witnesses that after rugby-5 training nearly workability was restored nearly by 100%. Concerning pupils of control group, after final part of physical culture lesson, restoration of organism's workability was incomplete.

Table 4.

Pulse metering data of control group pupils (n=30).

HBF indicator	I measuring	II measuring	III measuring	IV measuring
	$\bar{X} \pm m$	$\bar{X} \pm m$	$\bar{X} \pm m$	$\bar{X} \pm m$
At the beginning of lesson	72±8.1	75±7.8	73±8.3	72±8.2
After physical load	110±12	108±13	106±12	112±12.8
At the end of lesson	86±10	88±12	87±10	88±10.2
Ruffiet's index	9.2 – satisfactory	10.3 – satisfactory	10.2 – satisfactory	10.0 – satisfactory

Mean HBF indicators of control group pupils are given in table 4 and witness about insufficient level of restoration and low Ruffiet's index, which varies at the lowers satisfactory level for age group of 10-12 year old (after 11 points Ruffiet's index is unsatisfactory). In diagram (fig.1) the dynamics of increasing of loads on cardio-vascular system of control group pupils is shown as well as restoration of workability by results of HBF measuring.

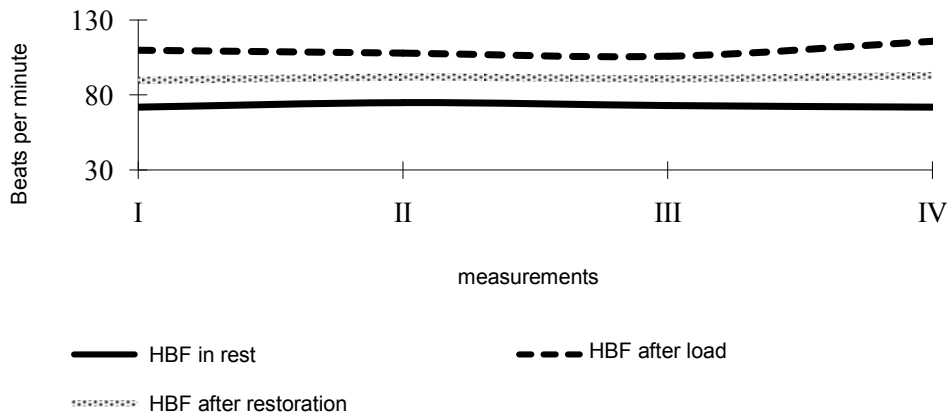


Fig.1. Dynamics of HBF of control group pupils under influence of physical culture training

HBF of experimental group's pupils, who played rugby-5 at physical culture lessons, restored practically up to initial level (see fig.2).

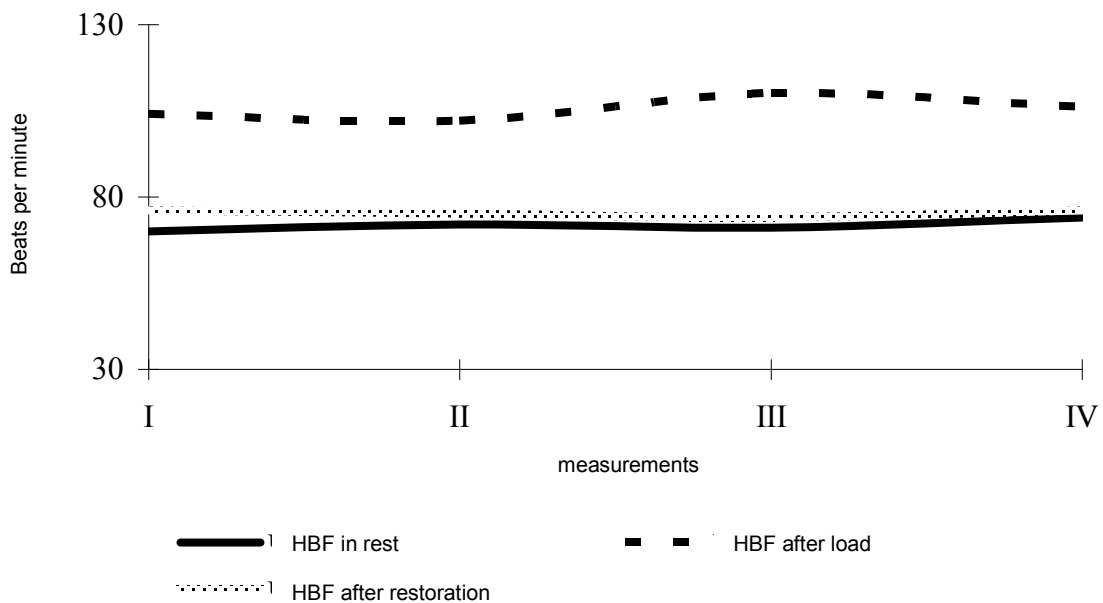


Fig.2. Dynamics of HBF of experimental group pupils under influence of physical culture training

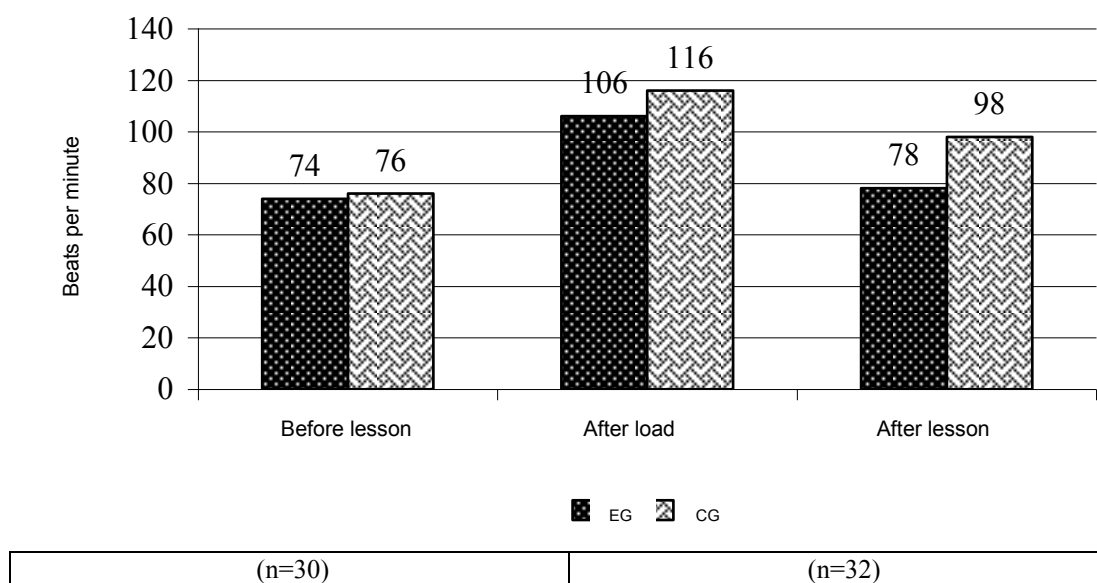
The level of physical load on cardio-vascular system was equal for pupils of both groups. I.e. the level of physical work with playing rugby-5 is as high as in other outdoor games. But with it restoration of organism's workability is much better owing to correspondence of loads to possibilities of organism's cardio-vascular system: load-rest (see table 5).

Table 5.

Pulse metering data of control group pupils (n=32)

HBF indicator	I measuring	II measuring	III measuring	IV measuring
	$\bar{X} \pm m$	$\bar{X} \pm m$	$\bar{X} \pm m$	$\bar{X} \pm m$
At the beginning of lesson	70±8.1	72±7.8	71±8.3	74±8.2
After physical load	104±12	102±13	110±12	106±12.8
At the end of lesson	76±10	75±12	74±10	76±10.2
Ruffiet's index	5.1 – good	4.9 – good	5.5 – good	5.6 – good

Analysis of the obtained indicators witnesses that HBF of control group pupils restored by up to 75%, HBF of pupils, who played rugby-5 restored by up to 95% after finishing of lesson (see fig.5).



EG – experimental group, CG – control group

Fig.5. comparison of mean HBF indicators of control and experimental groups' pupils under influence of physical load

After rugby-5 Ruffiet's index of experimental group pupils is much better than the same indicator of control group pupils, which confidently differ ($p < 0.01$) in restoration of organism's workability and its adapting to physical loads.

Thus, we can affirm that rugby-5 trainings are acceptable for child organism's functioning, adequate to possibilities of 10-12 years old pupils and facilitate physical development of children.

Summary

1. It has been established that though rugby is a contact and power game its kind – rugby-5 is contactless adapted for children model of the game. It permits to recommend rugby-5 for introduction in school program.
2. The fulfilled analysis of physical level and physical preparedness's indicators of 5-form pupils, who trained rugby-5, witnesses about uncertainty of differences from the same indicators of 5-form pupils, who played basketball, football or practiced gymnastics ($p > 0.05$). It points at equal significance of rugby-5 and other kinds of sports, which are included in school program, and at the fact that this kind of sports is adapted to physical indicators of 10-12 years old pupils. The obtained results permit to recommend rugby-5 as a part of program of pupils' physical education.
3. Rugby-5 trainings are acceptable for child organism's functioning, adequate to possibilities of 10-12 years old pupils and facilitate children's physical development.

The prospects of further researches are development of methodic provision for introduction of rugby-5 in school program and scientific foundation of program of development of junior rugby schools in Ukraine.

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