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ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

THE INFLUENCE OF FOOTBALL TRAINING ON THE DEVELOPMENT OF ADOLESCENTS, THE FORMATION OF ENDURANCE AND FUNCTIONAL CAPABILITIES

Speciality: 2411.01 – Human and animal physiology

Field of science: Biology

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GENERAL CHARACTERISTICS OF WORK

The urgency and the problem of research. One of the most characteristic features of modern sports is a significant increase in the amount of training load and the struggle with high levels of psychological stress. The problem of individualization of training loads depends on the age, sex, sports specialization, somatotype of adolescents, and its study is characterized by modernity, relevance and lack of practical research. This problem is more prevalent among children and adolescents and is part of the emotional-motivational part of their behavior. Such sports include "the best game" - football. Football game reflects a unique model of motor activity, the successful implementation of which determines the functional state of the central nervous system[1].

As new evidence is needed to systematize the functional, physical and adaptive capabilities of children and adolescents, it requires summarizing the results obtained over time and duration during a critical period in the development of the body of boys who train in football units. Football training is a very suitable model for studying the physical ability of children and adolescents and their adaptation to the loads performed. The application of a large number of inspections, training and competition loads in the early stages of training in adolescent football players significantly optimizes the conduct of medical and biological control.

As a result of generalization of scientific-methodical, scientific-research works and opinions of football specialists, it became clear that it is very important to carry out comprehensive control over the body of children and adolescent football players, taking into account their physiological development. With the help of such an approach, it is possible to effectively influence the technical, tactical and physical training of young players. The role

[1]Баевский, Р.М. Оценка адаптационных возможностей организма и риск развития заболеваний /Р.М.Баевский, А.П.Берсенева. – М.: Медицина, 1997. – 236 с.

of morphofunctional indicators in achieving high sports results, choosing training methods and tools, and choosing sports is irreplaceable. Determining a favorable (sensitive) period in the development of physical qualities and creating conditions for their development creates the basis for achieving high sports success, has a positive impact on improving sportsmanship. Therefore, the organization of medical control over the level of ontogenetic development of children and adolescents involved in football helps to monitor their morphofunctional status and plan the training process[2]. However, since the existing literature does not fully reflect the dynamics of how the morphological and functional characteristics of children and adolescents change under the influence of applied physical loads, the solution of the studied problem becomes even more relevant.

The purpose and objectives of the study. The main aim of the dissertation was to reveal the regularities of ontogenetic development, growth mechanisms and development of football players aged 10-15 years, identify the nature and direction of physical and functional training, and physiologically justify their correction.

Research objectives:

1. To determine the impact of sports training on the morphological and functional development of adolescent players aged 10-15 years.

2. To study the influence of different levels of training process on the dynamics and adaptation characteristics of cardiorespiratory system for adolescents aged 10-15 years.

3. The physiological characterization of functional readiness for physical load and determination of adaptive

[2]Кардиогемодинамика у юных спортсменов с функциональными изменениями сердца / И.Т.Корнеева [и др.] // Теория и практика оздоровления населения России: материалы 1 Национ. науч. – практ. конф. с междунар. участием. – М., 2004. – с.115 – 116.

capabilities in the annual training process for adolescent soccer players.

4. To study the impact of test loads on the functional and adaptive capabilities of adolescents in the dynamics of the annual training process.

5. To study the overall endurance, physical ability and maximum oxygen consumption in the dynamics of the annual training process for teenagers.

6. Assessment of blood lipid peroxidation oxidant and general antioxidant sistems (LPO-AOS) capability of adolescent soccer players during appropriate training periods (pre-training, pre-race and race cycles).

7. Biochemical justification of adaptation of adolescent soccer players to physical load during training and assessment of total antioxidant capacity LPO-AOS.

Theoretical significance - The existing literature provides some ideas on the impact of football lessons on the growth and development of children and adolescents aged 8-10, 11-12, 13-15 years, their ability to work, and considers issues related to adaptation. It should be noted that it is important to study the effects of football training on the somatic development of children and adolescents, the formation of physical qualities and motor skills, and this is confirmed by the results of numerous studies[3]. Since the definition of physical development, ability to work, morphofunctional indicators of adolescent football players for all age groups and the impact of football trainings on them is both practical and theoretical, it provides a basis for making adjustments to training programs based on the general laws of age physiology.

Scientific novelty of the study - The effect of football training and standard physical loads on the development, ability to

[3]Вайнек, Ю. Спортивная анатомия. Уч. пособие (пер. С нем. В.А. Куеминой).- м: Из- во «Академия», 2008. 304 с.

work and adaptive capacity of 10-15-year-old football players has been studied in a comprehensive way. Morphometric, physiometric and functional indicators were determined during the training of footballers using separate training programs and the results were compared with the results obtained from their peers. The applied training programs were given physiological characteristics. It was found that the determined activity of catalase and α-amylase, the main antioxidant enzymes of peroxide oxidation of lipids to control the process of adaptation to applied physical loads, is directly proportional to the increase in sportsmanship. LPO products, as well as catalase and α-amylase enzyme activity, can be used as a criterion in sports practice to assess the effect of physical activity on the adolescent body.

The Practical Importance of Research - Since the morphofunctional changes in adaptation to physical loads in adolescent footballers are of a different nature, it is very important to choose the appropriate age and training load for optimal adaptation. The obtained data can be successfully used both in the selection of exercise loads and in their dosing. Increasing the volume of physical activity intensifies the formation of LPO products and intensifies the antioxidant reaction in them. Therefore, the effect of exercise loads performed by adolescents on the activity of catalase and α-amylase in LPO products can be determined non-invasively. Thus, by determining morphometric, physiological, and non-invasive biochemical parameters in different age groups of adolescents, it is easier to assess adaptation to physical loads as an informed criterion. There is no doubt that the results will be of interest to sports physiology, sports medicine and specialists, coaches and athletes working in this field.

The main provisions of the defense:

1. Training applied in football trainings under the influence of loads leads to an increase in morphometric parameters of 10-15-year-olds, changes in the dynamics of physiological

parameters and functional changes of the cardiorespiratory system do not lead to any disorders in their health.

2. Causes positive changes in cardiorespiratory and hemodynamic parameters during the adaptation of children and adolescents aged 10-15 years to physical loads, is accompanied by passive changes in the activity of catalase and α-amylase enzymes in LPO products in saliva.

3. Morphometric, physiological and non-invasive biochemical parameters can be attributed to the criteria of adaptation of 10-15-year-olds to physical loads applied in football training.

Approval of the dissertation - The main materials of the dissertation were presented at the following scientific conferences and symposiums:

1. Features of basic anthropometric and physiological indicators of adolescents in the process of football. Modern football: status, problems, innovations and prospects of development materials of the All-Russian scientific-practical conference with international participation[4].

2. Aerobic performance of qualified football players playing in different positions on the football field[5]. Study of the adaptation

[4]Алиев, И.С. «Особенности основных антропометрических и физиологических показателей подростков в процессе занятий футболом». // Сб. Современный футбол: состояние, проблемы, инновации и перспективы развития: материалы Всероссийской научно-практической конференции с международным участием 29-30 июня 2018 года,- Казань: Поволжская ГАФКС и Т, 2018.

[5]Алиев, И.С. Аэробная работоспособность квалифицированных футболистов, играющих в различных позициях на футбольном поле. / С.А.Алиев, А.М.Ибрагимли // Украина. Материалы Международной научно-практической конференции 23 ноября 2018 Переяслав-Хмельницкий 2018 с.8-17.

of the functional state of the cardiorespiratory system of 13-15-year-old football players to physical activity[6].

3. Adaptation of physiological systems of the body of 13-15-year-old football players to muscle activity. Materials of the Republican Scientific Conference on Modern Problems of Biology dedicated to the 100th anniversary of the Azerbaijan Democratic Republic[7].

4. The impact of football training on the development of adolescents, the formation of endurance and functional capabilities. Materials of the scientific-practical conference dedicated to the 90th anniversary of the corresponding member of the Academy, honored scientist, professor D.V. Hajiyev 2019. Medical University.

5. The effect of antioxidants on the physical performance of athletes. Materials of the V Congress of Azerbaijani Physiologists dedicated to the 50th anniversary of the Institute of Physiology named after A.I. Garayev 2017.

6. Comparative analysis of the activity of antioxidant enzymes and the amount of malon dialdehyde in the blood of athletes. Actual problems of B / t and sports Conference materials of ASAPES. Baku, 2018.

The results of the study are applied in the training process of young football players at the "Vatan" football school under the

[6]Алиев, С.А. Исследование адаптации функционального состояния кардиореспираторной системы 13-15-летних футболистов к физическим нагрузкам./ И.С.Алиев; С.С.Алибекова, А.М.Гаджиев //Сборник конференции "Здоровье нации и усовершенствование физкультурно-спортивного образования" 3-4 октября 2019 года город Харьков, Украина.64-67 с

[7]Əliyev, İ.S., Əliyev, S.A., Əlibəyova, S.S., Əzələ fəaliyyətinə 13-15 yaşlı futbolçuların orqanizminin fizioloji sistemlərinin adaptasiyası. // Azərbaycan Xalq Cumhuriyyətinin 100 illik yubileyinə həsr olunmuş "Biologiyanın Müasir Problemləri" Respublika Elmi Konfransının Materialları – Bakı (23-24 oktyabr 2018). s.56-63

Ministry of Education of the Republic of Azerbaijan and an application act was obtained.

Name of the organization where the dissertation work was carried out: The subject of the dissertation work was done at the "Sports types" department of the Azerbaijan State Academy of Physical Culture and Sports.

Published works - 15 works on the topic of the dissertation were published.

Structure and scope of the dissertation. The dissertation was published on a computer page in 191 pages written in the Azerbaijani language (238532 symbols in total). He wrote "Contents" (3158 symbols), "Introduction" (21071 symbols), the main content of the dissertation (182287 symbols), "Discussion of research results" (24687 symbols), "Results" (3005 symbols), "Practical recommendations" (1718 symbols), “List of used literature” (40494 symbols).

"The main content of the dissertation" is divided into 4 chapters. Chapter I “Literature review” (86381 symbols), Chapter II “Organization and methods of research” (15434 symbols), Chapter III “Morphological and physiological indicators of adaptation to physical loads applied in football lessons” (80472 symbols), Chapter IV “Discussion of research results ”(24687 symbols), results and a list of cited sources. The illustrative material is presented in the form of 29 tables and 21 diagrams. The bibliography includes 255 sources, 12 in Azerbaijani, 231 in Russian and 12 in English.

- The dissertation consists of 191 pages of computer text, introduction, literature review, description of objects and research methods, research results, their discussion, main results and a list of cited sources. The illustrative material is presented in the form of 29 tables and 21 diagrams. The bibliography includes 255 sources, 12 in Azerbaijani, 231 in Russian and 12 in English.

Materials and methods of research. The research was carried out in three stages and the application of complex scientific methods is planned: analysis of literature sources, determination, analysis of morphometric, physiometric and biochemical indicators, experimental organization of the training process, development of methods of mathematical statistics.

Methods of studying morphometric indicators. Features of the physical development of the body in adolescent football players were carried out by morphological and functional methods, body length, weight, width of the chest, strength of arm and torso muscles, length of the neck in the sitting position, neck, abdomen, thighs, thighs, arms, arms, The length of the legs and paws was determined. The following anthropometric and morphometric indicators were used to assess physical development, taking into account the movement specifics of football[8]:

1. Age – is determined to accurately determine the age of adolescents and to properly form them into groups of 10-11 years, 12-13 years and 14-15 years.

2. It is determined by height with the help of a rostomer. The examinee stands with his back against the perpendicular column, touching it with his heels and back. The tablet is lowered until it touches the end, the indicator is marked.

3. Body weight is determined on a medical or electronic scale.

4. The width of the chest, pelvis, thighs, calf, hips, arms, fore arm is determined with the help of a centimeter (cm) tape.

5. The length of the base, upper arm, thigh, calf and paw was also measured with a centimeter tape.

[8]Живова, Т.В. Возрастная биохимия /Т.В.Живова, Т.Т.Невзороват. СПб: 2013, - 58 с.

Methods of studying physiological parameters and functional load samples. (NHR) – the number of heartbeats, measured by palpator electronic measuring devices.

ABP – arterial blood pressure is measured with a sphygmomanometer (Rivo-Rochi) and a phonendoscope.

PP – pulse pressure is calculated as the difference between systolic and diastolic pressure.

VC – the vital capacity of the lungs is determined with the help of a spirometer, the best result of the three measurements is recorded.

Dynamometry – strength is measured in three attempts and the best result is recorded.

Tolerance constant. Normally, the tolerance constant is 16, and as the tolerance increases, this constant decreases, so the calm is multiplied by NHR 10 and divided by the pulse pressure, and the endurance constant is found.

Circulatory efficiency is constant (CEC) = PP × NHR, which is equal to 2600 at this constant norm, increases with fatigue, decreases with cardiovascular training.

Cedar index (CI) = 1-PP / NHR (calmness) × 100

The cedar constant is close to 0 in the norm, increases with increasing sympathetic tone, decreases with increasing parasympathetic tone. When both parts of the autonomic nervous system are equal, the CU is close to 0 (CU → 0).

The Barbell and Genche test - characterizes the duration of respiration in the case of breathing and exhalation, allows you to assess the condition of the respiratory system and the resistance of brain cells to hypoxia.

The Harvard step-test index characterizes the general physical capacity and the level of cardiovascular function (Table 2.3.2.). In the Harvard step-test, a teenager climbs up and down a 40-cm-high ladder for 3.5 to 5 minutes at a given pace[9]. The rate

[9]Кардиогемодинамика у юных спортсменов с функциональными изменениями сердца / И.Т.Корнеева [и др.] // Теория и практика

of ascent and descent is 30 per minute. Immediately after completing the task, the athlete sits down, counts the UVS for the first 30 seconds, starting from the 2nd minute, and evaluates according to the schedule.

Another method for determining physical performance is the bicycle ergometric PWC170 test. This is a simpler method, in which the volume of load I is applied to 1 watt or 6 kgm / min per 1 kg of body weight, and the volume of load II is applied to 12 kgm / min per two kg of body weight. After determining the intensity of the load according to the initial value of the VVS, the pulse rate at the time of relative calm is counted and this value is multiplied by a constant (k).

Biochemical methods. The amount of LPO products, the activity of the enzymes catalase and alpha-amylase were measured in saliva to study the effect of adaptation of adolescents to physical loads on biochemical parameters in football training[10].

Primary and secondary products of lipid peroxidation LPO were determined by the IA Volchegorsky method[11]. Catalase, an antioxidant enzyme in saliva, has also been identified as an α-amylase enzyme activity in LPO products.

The results of the study were processed using the method of variation statistics – Student t-criterion, as well as the generally accepted method of mathematical statistics.

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[10]Ланкин, В.З. Свободно – радикальные процессы в норме и при патологических состояниях /В.З.Ланкин, А.К.Тихазе, Ю.Н.Беленков: Пособие для врачей. – М., 2001. – 78 с.

[11]Волчегорский, И.А. Сопостовление различных подходов к определению продуктов перенисного окисления липидов в чектап изопропанольных зкстрактов крови // Вопросы мед. Химин -1989,№ 1.с 127-131.

Research results and their discussion

1. Features of the dynamics of physiological indicators of adolescents in the process of football training

Among the physiological indicators of adolescent football players, NHR, ABP, PP, VC and hand dynamometry were determined in all three groups and are shown in Table 1. The analysis of the dynamics of the obtained physiological indicators showed that the physical loads applied in football training had a positive effect on the functional state of the cardiovascular, respiratory and neuromuscular apparatus of adolescents.

As shown in Table 1, the results of the NHR, PP, ABP and VC confirm positive adaptive changes in the physical performance and efficiency of the cardiovascular and respiratory systems of adolescent footballers. Thus, with the increase in the level of sportsmanship and physical fitness in adolescents, there is a decrease in stress and an increase in the performance of cardiorespiratory systems. Indicators VVS decreases from 10-11 years to 12-13 years by 18.5%, and from 12-13 years to 14-15 years to 16.5%; TS decreased by 28.5% from 10-11 years to 12-13 years, and by 48.6% in adolescents from 12-13 years to 14-15 years; The size of VC was 34.5% between the ages of 10-11 and 12-13, and 33.3% among adolescents between the ages of 12-13 and 14-15. ABP measurements were maintained within accepted general biological norms, only in group III they increased reliably to 13%.

Thus, physiological changes in the cardiovascular and respiratory systems that occur as a result of exercise in adolescents characterize long-term adaptation. It should be noted that the efficiency in the functions of NHR, PP, ABP, optimizing changes in VC and dynamometry completely covered the body. The physical loads applied to the players during the training process have a positive effect on the physiological state of the

cardiovascular, respiratory and nervous-muscular systems, creating conditions for the normal course of long-term adaptation.

Table 1.

Characteristics of the dynamics of physiological indicators in football athletes and adolescents who are not involved in sports (MM)

Physiological indicators	I – NQ (n=12)	I - EQ (n=12)	II – NQ (n=12)	II - EQ (n=12)	III - NQ (n=12)	III - EQ (n=12)
HB, b/min	87± 0,80	88±0,60	77±1,90	75 +±+ 0,65*	72±0,30	66 +±+ 0,60**
TS, min.times	22± 0,87	23±0,60	19±0,40	17 ±+ 0,060*	17±0,25	15 +±+ 0,042**
SBP (mm.s.st)	106± 2,10	108± 5,50	112± 3,40	115 ± 7,50	118±3,60	120 ± 8,60*
DBP (mm.s.st.)	70±1,10	72±0,50	70±0,75	72 ±+0,54	72±0,95	75 ±+ 0,60*
AHT (ml)	1800±20,10	1900±30,20	2300±36,30	2600±+40,80**	2800± 30,80	3500+± +30,60**
Dinamomet-riya (kgm)	22±0,90	23±0,25	27±0,080	28 ± 0,030	30±0,70	39+±+ 0,63**

*Note: * -p≤ 0.05, ** -p≤ 0.01 - Reliability of differences with respect to group I; + -p≤0.05, ++ -p ≤ 0.01 - Reliable differences between adolescent players and non-sports groups; I - children aged 10-11 not involved in NQ sports, II - NQ children 12-13 years not engaged in sports, III - children aged 14-15 not involved in NQ sports; I - EQ - 10-11 years, II - EQ - 12-13 years, III - EQ - 14-15 years*

2. Specific features of changes in functional indicators in adolescents in the course of football lessons

The stage of improving the adaptation to physical loads applied in football training is characterized primarily by the formation of structural scars

Table 2 shows the functional indicators created by the test loads applied in groups of young players (Table 2). As can be seen, the interaction between the body's functional systems is significantly enhanced by improved coordination of the useful work of these constants, so that the body solves the tasks set by exercise with less energy. It is clear from the results that the calculation of all indices and indicators confirms the positive changes in the body systems of children and adolescents aged 10-15 years and the increase in physical performance.

Thus, the analysis of the indicators of the functional status of adolescent athletes engaged in football showed that to some extent adapted to the applied training load, a systematic trace was formed. This manifests itself more in the coordinated nature of morphofunctional changes and intersystem interactions in training.

Table 2

Influence of football loads on adolescent test loads on functional indicators of the cardiorespiratory system (mm)

Indicators of functional status	I - EQ (n = 12)	II - EQ (n = 12)	III - EQ (n = 12)
Endurance constant	27 ± 0,040 100%	19 ± 0,040 68,2%	15 ± 0,035 54,9%
Sustainability of blood circulation	2869 ± 25,32 100%	2805 ± 18,57 96,5%	2630 ± 30,12* 90,3%
Index of cedar	27 ± 0,060	- 0,5 ± 12,14	- 24 ± 25,16
Shtange test	46 ± 0,50 100%	62 ± 0,65* 123,3%	86 ± 0,45** 180,8%
Genshe test	16 ± 0,050 100%	25 ± 0,052 156,6%	45 ± 0,50** 290%
Skibinsky Index	8 ± 0,030 100%	16 ± 0,32** 200%	35 ± 0,65** 480%
Ruffle Index	15 ± 0,060 100%	9 ± 0,055** 58,2%	5 ± 0,060** 29,5%
Functional norm Index	1,9 ± 0,022 100%	0,57 ± 0,0030** 30,5%	0,26 ± 0,058** 14%
Adaptation potential	1,89 ±0,034 100%	1,90 ± 0,040 100%	1,91 ± 0,010 100,5%
Harvard Step - index of test	67 ± 0,65 100%	90 ± 0,70* 135,9%	109 ± 0,60** 164,6%
Health state (according to Apanasenko)	8 ±0,050 100%	14 ±0,55** 186,6%	15 ±0,70** 200%

*Note: * - p ≤ 0.05, ** - p ≤ 0.01 - Reliable differences with respect to group I;*

I - EQ - Experimental group (10-11 years); II - EQ - Experimental group (12-13 years); III - EQ - Experimental group (14-15 years).

3. Physiological characteristics of functional training for physical activity in the annual training process in adolescent football players

A comparative analysis of the physical and functional fitness of young players was conducted and the results are presented in the following tables (Tables 3 and 4). As can be seen from Table 3, the increase in the first and second macrocycles was the same in both the control group and the experimental group in terms of height and mass characteristics. Athlete's neck size was 2.2% in the control group and about 2.2% in the experimental group. Similar patterns were observed in relation to body weight.

In the four-month macrocycle, there was a 6.4% increase in control group adolescent players, compared to 5.1% in the experimental group (p> 0.05). In the second macrocycle, in young players from both groups, these values were 6.4% in the control group and 5.1% in the experimental group (p> 0.05). In both macrocycles, according to the absolute values of the athletes, body weight was 12.1% in the control group and 13.2% in the experimental group.

The average score of the results of functional and physical training of 10-14-year-old football players during the annual training period in the control group compared to the model indicators was as follows: UVS at rest - 4 beats / min; Ruffye index - 2.3 sh.v .; TS - 2.7 times / minute; AHT - 405 ml; The running speed for the distance of 60 m was 0.5 seconds, the speed of the run for the distance of 3 x 30 m was 1.0 seconds. In the experimental group, the indicators were as follows; UVS at rest -

0.5 beats / min; Ruffye index - 0.7 sh.v .; TS - 2.4 times / minute; AHT - 240 ml; The running speed for 60 m was 0.1 s, the running speed for 3 x 30 m was 0.5 s.

Table 3.

Comparative dynamics of morpho-functional indicators in adolescent soccer players (M ± m)

Groups	Indicators / Number of investigations	Boy, sm	Body mass, kg	HR, beat/min	PP, times/min	VC, ml	HR restoration	
							HR_1, b/min.	HR_2 b./min.
Control group	First (I)	155	43	81	24	2070	130	90
	Second (II)	157	45,7	78	23	2150	120	86
	Third (III)	162	46,9	75	21	2300	115	82
	Increase, absolute, %-lə	3,3	2,5	2,5	1,7	60	3,6	3,9
		2,2	6,4	2,9	6,3	6,4	2,8	3,8
	General, absolute %-lə	6,4	5,6	4,6	8,4	6,7	8,4	6,7
		4,0	12,1	5,9	6,6	7,0	6,6	5,1
Experimental group	First (I)	156	46,3	80	25	2050	125	86
	Second (II)	157	45,3	78	24	2160	120	80
	Third (III)	160	47,8	74	22	2280	108	76
	Increase, absolute, %-lə	3,4	3,5	2,4	1,2	230	4,6	5,7
		2,0	5,1	5,9	7,0	5,4	6,5	6,1
	General, absolute, %-lə	6,8	7,0	4,8	2,6	345	9,2	10,4
		4,2	13,2	8,8	15,0	10,8	9,8	12,2
	Average model indicator	163	50	74	20	2500	110	80

Thus, a comparison of the control and experimental group of adolescents' improvement in functional and physical fitness showed that changes in the eight-month training process were previously evident in the Ruffie index, VC, PP, shuttle speed at 60 m and 3 x 30 m. . This is achieved as a result of systematic training with adolescents, indicating the development of specific adaptations in the body of children and adolescents to the applied physical loads. The nature of the depth of long-term adaptation is determined by the optimal planning of training loads and rest parameters. This is confirmed by the fact that the teenagers who took part in the experiment successfully performed in the competitions during the inspections. Functional training, which plays an important role in improving the physical performance of adolescent footballers, paves the way for long-term adaptation to the effects of physical activity, which is a characteristic feature of modern children's and adolescent football[12].

This leads to the conclusion that as the level of sportsmanship increases in the training process, adaptive-physiological adaptation reactions occur in the body of adolescent footballers, which helps to increase the level of both general and specific physical fitness in athletes. This is confirmed by the good performance of young players in meetings and competitions. It should also be noted that functional training plays a key role at all levels of athletes' training.

[12]Платонов, В.Н. Система подготовки спортсменов в олимпийском спорте /В.Н.Платонов. – М.: Олимпийская литература, 2004. – 808 с

Table 4.

Comparative dynamics of indicators of functional and physical training in adolescent soccer players (mm)

Groups	Indicators	Ruffle Index, IR, TL	60 m running, sec	3 x 30 m shuttle run, syc	ABP, mm.s.st	
	Number of investigations				Sistolic, mm.s.st.	Diastolic mm.s.st.
Control group	First (I)	10,3	8,7	15,3	112	73
	Second (II)	9,1	9,0	16,6	113	74
	Third (III)	8,1	9,8	15,4	114	76
	Increase, absolute,	2,2	0,5	0,1	2,0	3,0
	%	2,5	3,3	2,3	2,5	6,5
	General, absolute,	3,3	1,1	1,14	2,5	4,0
	%	11,1	5,3	11,8	15,3	54,8
Experimental group	First (I)	11,2	8,6	14,6	112,0	73
	Second (II)	10,3	9,1	16,0	113,0	74
	Third (III)	6,7	8,5	15,2	114,0	75
	Increase, absolute,	3,6	0,1	0,8	3,0	2,0
	%	26,8	6,6	11,0	2,8	2,7
	General, absolute,	4,7	0,7	2,2	4,5	5,5
	%	35,5	5,6	11,5	3,6	8,0
	Average model indicator	6,0	8,4	14,7	112,0	72,0

4. To study the state of general endurance, physical performance and maximum oxygen consumption in the dynamics of the annual training process of adolescent football players

The physical ability of athletes is a prerequisite for the development of all physical qualities and depends on a number of factors. Control over the level of physical ability is carried out only on the basis of external mechanical performance and the necessary information is obtained. The level of physical activity can be determined by the maximum oxygen consumption (OMC). There are many methods for determining the OMC, the most common of which are nomograms and veloergometric methods. The level of physical fitness of athletes is often determined by endurance. Endurance is characterized by the ability to work for a long time at a given intensity. Endurance is measured over a period of time until the energy reserves of the moving organism are fully exhausted. Endurance depends on the athlete's aerobic and anaerobic energy capacity, so the methods used for its development should be more focused on increasing bioenergetic resources.

Comparing the results with the results of previous studies, it was found that the performance of PWC_{170} and OMC was higher than that of their peers who trained in special sports classes (training groups) and their peers who trained in the regular program. While it guarantees better levels of physical development, physical performance, and overall endurance in young players who train in these training groups, it is more difficult to predict such a guarantee in those who train with regular training programs. However, based on the results, PWC_{170} and OMC in adolescent players in training groups, as well as in adolescent players using regular training programs, deteriorated sharply at the age of 14, there were good conditions for adaptation, and the phenomenon of heterochronous staining

during puberty. The "physiological value" against loads of the same relative intensity increases against the background of strengthening. It can be assumed that the pedagogical impact on the development of training of 14-year-old football players may be less effective if the amount of training load is not reduced at a given stage of ontogeny[13].

5. Biochemical indicators of adaptation of teenagers to physical loads in football lessons

Catalase, α-amylase, LPO products in saliva have been prescribed to study the course of biochemical changes in the body under the influence of physical activity. This series reflects the dynamics of biochemical parameters of saliva, which characterize the activity of non-specific antioxidant defenses in adolescent athletes and the course of peroxide oxidation of lipids in the body.

The results show that the LPO products dissolved in heptane in the saliva of adolescent athletes have not changed much. A similar pattern was observed in the amount of LPO products dissolved in isopropanol. This suggests that the antioxidant system of non-specific adaptation functioned optimally and to some extent prevented a reliable increase in LPO products in the body of adolescent footballers under the influence of various physical loads, without damaging the cell membranes of organs and tissues.

Catalase, as an antioxidant enzyme, catalyzes the breakdown of hydrogen peroxide, a very important function in the blood. A comparative analysis of oral catalase enzyme activity in adolescent athletes and their non-athlete peers found that the activity of this enzyme was 2.2% higher in 12-13 year olds and 9% higher in 14-15 year olds than in non-athletes.

[13]Шаханова, А.В. Влияние различных двигательных режимов на онтогенетическое развитие мальчиков. – Валеольгия. - 2001. – №2 - с.56 - 66.

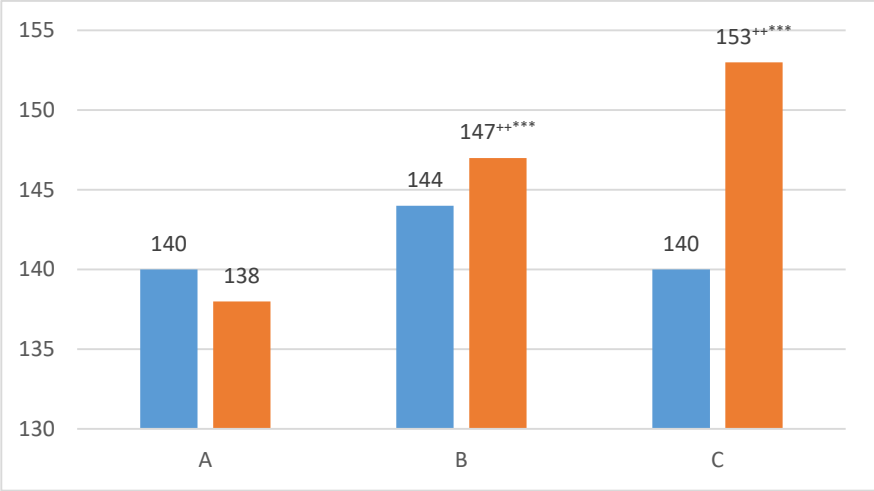

Figure 2. Indicators of activity of catalase enzymes in adolescent soccer players and non-sporting children

Readings: catalase enzyme readings, nmol / mg / min;

Absis reading: A - I group, 10-11 - children, 1 - control and 2 - athletes;

B - II group, 12-13 - seniors, 1 - control and 2 - athletes; C - III group, 14-15 - seniors, 1 - control and 2 - athletes.

The biochemical adaptation that occurs in the body against muscle activity during the training process spreads to all functional systems involved in motor activity, and does not bypass this antioxidant system. The basic biochemical mechanisms of adaptive changes in the body's systems and organs are identical to the biochemistry of adaptive changes in muscles. They are considered to be metabolites that provide oxygen to energy

processes that are enhanced during muscle activity and are formed as a result of oxidation[14, 15, 16].

Analysis of the biochemical parameters of saliva in adolescent footballers showed that the amount of the first and second products of lipid peroxidation was not significantly reduced. This suggests that the response to disturbing reactions under the influence of exercise loads was more economical. Rather, the performance of LPO products is of greater importance under the influence of various physical loads. However, the increased activity of catalase as an antioxidant enzyme, as well as α-amylase enzymes, confirms the increase in the strength of the antioxidant part of the non-specific defense in the body of adolescent footballers. Positive adaptive changes are caused by the stress-damaging effects of physical activity. It should be noted that the positive changes achieved in the training process with footballers are aimed at strengthening the antioxidant system in the body of adolescents against physical exertion.

RESULTS

1. It has been established that soccer activities have a normal impact on the functional status and health of children and adolescents. While the overall morphometric rate of growth of

[14]Ланкин, В.З. Свободно – радикальные процессы в норме и при патологических состояниях /В.З.Ланкин, А.К.Тихазе, Ю.Н.Беленков: Пособие для врачей. – М., 2001. – 78 с.

[15]Гаджиев, А. М., Алиев, С. А., Агаева,С. Е.Физические нагрузки и оксидант –антиоксидантные взаимоотношения в мышечной деятельности. // Науч. труды и съезд физиологов СНГ, и съезд биохимиков россии, конференция. Сочи-Догомые, Россия, 4-8 октября 2016, с. 32

[16]Əliyev, İ.S.”Yeniyetmə futbolçuların morfofunksioal göstəricilərinə məşq və yarış yüklərinin təsiri” // AMEA-nın A.İ.Qarayev adına Fiziologiya inistutunun və Fizioloqlar cəmiyyətinin külliyatı Fiziologiya və Biokimyanin problemləri XXXV cild Elm 2017

players between 10-11 and 12-13 is 18.1% on average, 16.8% from 13-14 to 14-15 years, the main anthropometric indicators of teens aged 10-11 12.8% for 12-13 years and 13.8% for 12-13 years[1,4,7,12].

2. In addition to increasing physical ability, adolescent soccer players have experienced a decrease in cardiorespiratory system tension and an increase in work capacity (17.8% in the age group from 10-11 to 12-13, 15.8% in groups 12-13. TS decreased by 27.8% in children and adolescents from 10-11 to 12-13 years, and by 48% in adolescent players from 12-13 to 14-15; AHT size from 10-11 years 12-13 33.8% of adolescents and up to 33.8% of adolescents aged 12-13 years[5,8,11].

3. Changes in cardiac dynamics and hemodynamics have been observed for adolescent players in Groups II and III following both relative quiet time and standard physical loads. In young players 10-11 years 12-13 years, the cardiovascular system has an integrated index of 27.4%, 15.5% after exercise, and 38.4% for athletes aged 12-13; 13.5% of total physical load. The index of myocardial infarction (Xitter index) in children and adolescents aged 10–11 years and 13–14 years is 23% in silence, 11.5% after physical exercise, 14.3% in adolescents 12–13 years. However, there has been an improvement of up to 18.5% since the physical burden[13,14].

4. Physical workloads during football activities affect the activity of catalase and α-amylase enzymes, help increase the energy supply of the body's systems due to neutral fats, enhance the body's resistance to anti-inflammatory products, increase LPO resistance[2,3,15].

5. Symbolic changes in activity and regulation of adolescents' body systems at different levels have been observed, leading to an increase in indicators of greater physical fitness (19.8%). Specific integrated physical indicators increased to 27.01% and specific functional indicators to 91.4%[9, 12].

6. The volume and intensity of workloads were physiologically justified for each individual age group, and the factors influencing adolescents' adaptation to workloads and improving their health in the course of sport improvement and increased athletic ability were studied. These conditions constitute a systematic set of practical recommendations for coaches and junior athletes involved in the training of junior players. Optimization of racing and training activities of the adolescent organism, determination of specific and optimal conditions for them with the help of physiological approaches increased the practical significance of the research [6, 10].

PRACTICAL RECOMMENDATIONS

1. The volume and intensity of training loads should be physiologically justified for each individual age group, and the factors influencing the adaptation of adolescents to physical activity and strengthening their health should be taken into account in the training process. Such conditions have formed a systematic set of practical recommendations for coaches and athletes involved in the training of young players.

2. The main recommendations for coaches are the optimization of the physical development of the adolescent body through competition and training activities, the determination of specific and optimal conditions for them with the help of physiological approaches.

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