

REVIEW PAPER

Aspects of Increasing Efficiency of Young Football Players Physical Training Process

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Abstract

The results of the research indicate the intensification of training and competitive loads in children's football and their negative impact on the body of young athletes. The increase in the complexity of young football players training occurs due to the system of children's competitions and their requirements for the training process arrangement, the choice of criteria for monitoring loads and assessing athletes condition. The ways of minimizing pedagogical errors and preventing the use of inadequate loads in the training process are shown based on the strategy of preparing a sports reserve for professional football and maintaining health of young football players.

Keywords: *young football players, children's competitions, physical fitness, fitness control*

Introduction

Organizational and methodological aspects of sports training for young talented players largely determine the further success of a country in the international sports arena (Platonov, 2013; Nikolaienko, 2014). In recent years, the attention of football experts is increasingly focused not only on the development of training technology for highly qualified athletes, but also on the further improvement of the sports reserve training system (Haddad et al., 2015; Khizhevsky et al., 2018; Shaposhnikova et al., 2018; Gornikova et al., 2020).

At the same time, it should be noted that early sports specialization as well as its accompanying intense training and competitive activities are extremely dangerous, violating the objective laws of long-term improvement, leading to injuries and premature wear of the young athlete's body (Brenner, 2016; Green, 2019).

The way out of this situation is seen in the fact that regarding young football players engaged in intensive sports training, it is necessary to reconsider the traditional views on the process of long-term sports training and active participation of a child in this process. Planning of training and competitive loads should be conducted taking into account biological

mechanisms of adaptation by organs and systems of the child's body, optimization of the use of training effects that meet the specifics of the sport, development of a control system over the state of health and the reaction of young athletes to training loads.

It is the target orientation for long-term training of young talented athletes that should determine the strategy of building the training process in football.

Objective of the study is to substantiate the theoretical and methodological foundations of physical training of young football players based on the analysis of scientific and methodological literature, training and competitive activity.

Methods

Include theoretical analysis and generalization of data from scientific and methodical literature, materials of the Internet; pedagogical observation of physical training process of young football players.

Results

Health-preserving focus

It should be noted that the correct schemes in general and



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the ones corresponding to the current level of our theoretical and methodological ideas, knowledge, skills, abilities and methods of managing individual aspects of sports training process have not yet developed into a complete organizational and methodological system of long-term training process management.

As Mikhailova (2009) rightly noted, this is largely due to the fact that the coach must successfully manage not the process of sports training, but mainly the process of the athlete's training.

Based on this provision, we will focus on certain approaches that determine the quality and effectiveness of the long-term training program for talented youth. Regular involvement in football training classes presupposes the successful participation of the child in the mode of both intensive training and competitive activities. The latter means that young footballers must meet certain criteria for sports fitness. These include health, fitness, coordination skills, body constitution (physique), mental composition, motivation (Balsevich, 2009; Nikolaienko, 2014; Kostyukevich, 2018).

It is known that a significant factor in achieving sports success of a child is, above all, the state of their health. Hence, one of the components of a child's sportsmanship development is the regularity of educational and training activities. Children, who miss training due to increased morbidity, master the technical elements, improve functional and physical fitness, gain the theoretical basis of sports activities arrangement to a lesser extent.

Based on the fact that children join the football club section at the age of 6-7, the issue of a modern first-grade pupil's state of health is topical.

It is established that children of primary school age are characterized by the following problematic components: 15-20% of children have chronic diseases, 50% suffer from musculoskeletal disorders, 20-25% have nasopharyngeal diseases, 30-40% have neurotic disorders, 10-23% have developed allergic reactions, 10-25% have got disorders of the cardiovascular system (Kaminska, 2016).

Thus, initially low health level of primary-school-aged children seriously complicates their adaptation to educational, training and competitive activities.

It is obvious that increased motor activity for children and adolescents not only does not prevent the occurrence of functional blockage in various body organs and systems, but in some cases can even provoke them (Kashuba et al., 2012).

It has been found out that more than 70% of young athletes who are under 16-17 years old have various health disorders, some of which are the main cause of premature withdrawal from sports (Orlovskaya, 2000).

Therefore, while organizing the pedagogical process the coach must constantly make changes to the educational and training plan as well as take into account the dynamics of practical material mastering, and most importantly based on the fact that young players are engaged in intensive sports training, constantly monitor the body's response to training loads.

Educational and training process

Traditional system of an athlete's training is based on the fact that the human body will build itself, shall the athlete just complete the right motor drills. And still a large number of contemporary scientific papers on football, and sports in general come from the outdated in its half-hearted view of man as

a soulless biological entity.

However, the training of the athlete should be seen as the one especially focused on their psyche aimed at developing the ability to control body and metabolic processes in it, therefore, improving conditioned motor skills or training motor skills and abilities is the formation of mental programs to manage body movements and processes.

Hence, any arrangement of training process should be based on the fundamental position of the psyche and its priority as the original conscious or unconscious guiding principle for any practical human activity.

Given this, in order to teach a young football player, it is necessary to interact with their psyche, not with the physical body. Hence, it is important to focus on muscular performance being aware that the muscles carry out commands sent by the brain. Muscles are not able to study, unlike the brain. It is wrong to think that players will play better if their lung volume increases or that it is better to play with their head, if their leg muscle strength enhances. In order to learn to play football at a good level, it is not good to simplify football to the level of motor activity, but it is necessary to focus on solving motor issues in the process of football play (Engel et al., 2016; Wein, 2018).

In this regard, considering the structural features of children's functional fitness, the sequence of changes under the influence of targeted exercise, it should be noted that a living organism is a complex system that counteracts the environment and changes under its influence by activating adaptation mechanisms. The body can reach the same ultimate motor goal in different ways, using a set of the same reactions (Bernstein, 1991).

The coach is interested in the motor abilities of the child, i.e. mainly in the structure of their musculoskeletal system and movement regulation system. Assessment of these systems state should be performed using test exercises that do not require special motor experience and skills. Otherwise, it is not the conditioned motor qualities of the child that will be assessed, but the conditioned motor qualities plus the acquired skill in performing this motor action as well as individual skills, which in most cases is unacceptable (Guba, 2012; Žvan et al., 2018; Sarsania et al., 2019).

We should keep in mind that the human body, in terms of biomechanics of the musculoskeletal system, is a complex motor system with 244 degrees of freedom. The upper and lower extremities have 30 degrees of freedom. It is clear that a system with so many degrees of freedom can perform the same task with a different trajectory. Therefore, when performing the movement constant control over the working muscles is required, as no motor impulses to the muscles can ensure the accuracy of movement, no matter how accurate they are. Performing a given movement with high accuracy requires constant correction throughout the amplitude of the movement. This correction is done by the muscles that are involved in the movement as information about the progress of a given movement enters the brain from the periphery. Nervous devices (receptors) monitor for movement, "carried" to the periphery - in the joints, muscles, tendons. The so-called "proprioceptive impulses" go from these receptors to the brain, and it corrects the movement by involving auxiliary muscles or enhancing the work of antagonists.

Thus, motor skill in simple and complex movements cannot be a simple motor pattern, just as a conditioned reflex can-

not be a simple reflection in the motor centres of the brain. This is a complex, ever-changing process. Motor skill is not a formula for movement; it is not just a formula for muscle response reflected in the motor centre. Motor skill is the mastered ability to solve one or another type of motor task (Bernstein, 1991). Now it is clear that in order to perform a movement correctly, it is necessary to go through the path of the motor act hundreds of times, so that the sensitive centres can "feel" all possible deviations when performing this movement.

Hence, if the player knows how to act in game situations, their brain will adequately control the muscles. The more experience a player has in solving situational tasks, the faster they make the right decision. Therefore, the task of physical training is to improve the quality of playing football.

Well-known German specialist in children's football Wein (2018) has once remarked: "A beautiful game is football that starts in the head and ends in the legs."

That is why, the goal of the training process should be a playing boy (Ponomarenko, 2005). As the author notes, based on his practical experience, the training program should not be of small, medium or large load, because classes are not held for qualified athletes, but for children who need to be taught to play. Therefore, the important principle of working with young players is that everyone does everything in the optimal mode of their individual capabilities, on the verge of high but still possible to overcome difficulties. No motor tasks on the spot should be there, it is better to do everything in motion, at speed. No additional loads with a barbell, kettlebells, on treadmills are needed; vice versa all classes should be held on the football field (playground) and as much as possible, i.e. in the playing conditions. This will be enough for young talented players to develop harmoniously, without risk of developing scoliosis, lordosis and kyphosis, without pathologies of all body systems, but rather taking into account the daily routine, age, initial physical and game data. Every motor task or action must be justified and thought out. The player must know why it is necessary to perform this or that action, why this particular task and not another, and what is the benefit of this.

The Dutch specialist Verheijen (2017) has drawn attention to one of the main principles of physical training method for young football players, which is as follows: "When playing football, you should improve your physical condition. The higher the football player's level is, the higher the level of his ability to work is as well as the faster the recovery process takes place between actions." He has gone on to emphasize the importance of football sprints and reciprocal training games in small squads and small play areas so that the training process is at the centre of the game itself, rather than a 400-meter run or a long run around the field.

Competitive activity

The current practice of organizing children's and youth competitions provides for holding regular championships starting from the age of nine. Thus, children from an early age are forced to play in the same way as adults, with an emphasis on the result.

It is noted that when the result comes first, it violates the basic principles and patterns of training process design at the stages of long-term training, and as a consequence an imbalance between the level of young players' training and the requirements for professional football appear (Nikolaienko, 2017).

The focus on "winning at any cost" involves, above all, forcing the training process, with an emphasis on physical training, and as a result, it leads to premature depletion of the child's body, exacerbation of disease and injury, as well as limiting the technical and tactical potential of young football players (Stratton et al., 2004; Nikolaienko, 2014).

Hence, most coaches are narrowing the scope of their professional qualities usage. In fact, the management of sports activities for young football players today is reduced to the management of sports training. In other words, the main attention is paid directly to the training process, first of all, planning, dosing and control of training loads, the content of which is determined by the desire to achieve sports results quickly.

As a result, for a long time the domestic system of children's and youth football has been based on the principles of the "inverted pyramid": when from stage to stage the number of students in sports schools and clubs is steadily declining by "culling" less promising children who cannot show a good level of training and sportsmanship according to their leaders and coaches. Therefore, the whole system of children's and youth football, starting from the stage of initial training, is considered not as a system of a long-term training designed to meet the needs and progressive development of each child in sport, but rather as a means to meet the needs of professional football.

At the same time, it is established that from beginning of systematic sports training and before getting involved in sports of higher achievements, the system of competitions should be subordinated to the system of training (Platonov, 2013).

In this regard, for quality training and progressive development of talented football youth it is necessary to make changes in the existing practice of organizing and conducting children's competitions (Nikolaienko, 2017).

Regarding the successful formation of the initial level of physical fitness among young football players during their long-term training, it is necessary to take into consideration the age characteristics of the child's body and sensitive periods of conditioned motor qualities development (Nikolaienko, 2015).

It should be noted that when organizing and determining the content of sports training, coaches do not pay enough attention to changes in the functional state of young players, namely how they adapt to physical and psychological stress of different nature, volume and intensity.

It is difficult to imagine the coincidence of training programs and plans that determine the content, scope and intensity of this influence, even the most ingenious in predicting the dynamics of the young athlete's state, with the rhythm of sensitive periods of this influence perception (Balsevich, 2009).

Thus, the need to overcome this contradiction causes the coach to conduct continuous monitoring of the development of conditioned motor qualities and abilities as well as the state of functional systems of young football players' body (Nikolaienko, 2014).

In the pedagogical sense, such control will ensure a positive evolution of motor skills, adequate correspondence of motor actions to the needs of effective competitive practice and maintenance of homeostasis parameters in maintaining reserves necessary for normal life, as well as continuous correction of volume, intensity, forms of training aimed at achieving long-term training goals for young football players.

With this approach in mind the volume, intensity, content

and direction of training activities tend to be determined due to real processes occurring in the body of young athletes and the ones which are flexibly regulated by both coach and athlete, rather than fictional kilometres, kilograms and tons of expected weightlifting loads, number of approaches and repetitions or interval pace of overcoming competitive distances and unclear figures for construction of micro-, macro- and meso-cycles of sports training (Balsevich, 2009).

Regarding the chronology of motor abilities formation, it is necessary to pay attention to the sequence of their development: speed, speed-strength abilities, speed-strength endurance, power, general endurance (flexibility accompanies the development of all abilities).

Currently, in the practice of children's football training there is often another picture of the educational and training process – you can observe the development of speed and speed-strength endurance, and then speed increase, which creates barriers to the full development and realization of the child's potential.

In the process of developing conditioned motor qualities the coach must take into account that the child's adaptation should go, first of all, not with relation to the competitive size of the football field, but regarding competitive modes; thus, it is desirable to limit these competitive modes in space and time (Guba et al., 2015).

For example, if a young football player trains on a standard football field, instead of speed, which is manifested in the pace of movement, he develops speed endurance and another way of energy supply respectively.

Individualization

Coaches often have a question: what is better to develop - the strengths or weaknesses of the athlete? In this regard, there is a clear idea that the main strategy in training should not be “smoothing” the personality, but, vice versa, the development of athlete's strengths and personality as a leading condition for achieving high sports results (Platonov, 2013).

In particular, it has been found out that improving fitness motor skill, which is “lagging behind”, leads to harmonious physical development of children, but does not improve the results in the chosen sport over time. Increasing the initial level of the leading conditioned motor quality contributes to the growth of sportsmanship in sports associated with the manifestation of one, leading ability, i.e. quality (speed, strength, endurance, etc.); simultaneous development of leading and lagging fitness motor quality leads to increased sports results in game sports, where priority is given to the simultaneous performance of several motor actions or the development of abilities that differ in the structure of their performance (Guba et al., 2015).

In the formation and enhancing of motor skills it is necessary to either develop a leading conditioned motor quality (focus on sport), or improve “lagging” qualities (focus on health) in order to achieve the best sports results.

In the training process with young players involved you need:

to use motor tasks aimed at development of certain conditioned abilities that are relevant to real game;

to improve the leading conditioned abilities for the player;

to create such a structure of physical fitness in which all components are in harmonious relation to each other.

As the optimal structure of player's physical fitness we

should regard the level of development of individual fitness motor qualities, and such a ratio that allows the athlete to most successfully realize the potential accumulated in their training and achieve stable sports results (Stepanov, 2010).

Control and planning of training loads

It is known that physical training should be given close attention at all stages of football players' long-term improvement. However, the approaches to its implementation in relation to other aspects of football skills are significantly different.

When it comes to the development of football players' conditioned motor skills, it is usually associated with tired muscles, running, fever, profuse sweating, jerks, gym exercise, in other words activities aimed at improving athletic performance.

In this case, the training process is usually built in such a way that the load in the motor tasks is higher than those which players are usually used to.

However, the choice of training tools should be based on the fact that playing football is not just a combination of endurance, strength, speed, technical skills, and mental qualities and so on. These factors alone do not say anything about football skills of the players. It is important how the player reacts to different game situations and how he solves them. This is the main criterion for assessing skill in football (Szczepanski, 2015).

It is clear that implementation of this training aspect takes much longer than increasing muscle mass, jumping or lung volume. Therefore, the results in the Cooper run and the 30-meter run tests will not say anything about it.

Assessment of player's physical fitness level must be carried out taking into account the effectiveness of his actions in the game. For example:

- the ability to solve problems quickly, over a long period of time, in conditions of active confrontation with the opponent and the audience;
- ability to press, play creatively, quickly move from defence to attack and vice versa, etc.

The children's coach must know the basics of physical training; choose the right training tools, taking into account individual capabilities of the child's body, which are focused on, above all, creating such game situations that will encourage players to perform better, more often or faster, as shown in Table 1. The quality of the game is based on the ever-increasing complexity of performing motor tasks. It is necessary to “challenge” the players the way they are willing to accept. Evaluation of such tasks effectiveness will not consist of heart rate, distance that can be overcome, kilograms or minutes, but of the player's ability to perform the task (Ponomarenko, 2005).

The same conclusion has been reached Seluyanov, Sarsania and Zaborova (1991), who have found out that the average heart rate is not a criterion for the effectiveness of game. If the increase in heart rate is associated with the performance of game actions, i.e. accelerations, which are performed with maximum intensity and useful for the team as a whole, then such an increase of heart rate can be considered effective. In the case of heart rate increase as a result of running on a field of low intensity with the complete absence of useful actions for the game, such increase in heart rate cannot be considered effective, while the intensity of the load is high.

With regard to heart rate, the practice of football players' physical training is often based on the response of cardiovas-

cular system to motor tasks or competitive activity (Stolen et al., 2005; Godik et al., 2010; Bujnovky et al., 2019).

In this case, it is assumed that in the cyclic task, performed in the form of running it is necessary to determine the power of the aerobic and anaerobic thresholds. Heart rate is also determined for these thresholds. Next, it is presupposed that the pulse can determine the mode of power supply. If the task is performed up to the aerobic threshold, the load is aerobic. If the task is performed with a heart rate above the aerobic threshold, but below the heart rate of the anaerobic threshold (ANT), the load is of mixed nature. When the heart rate is higher than the ANT, the load has a glycolytic direction. This classification of loads is widely used in cyclic sports, but the legitimacy of its use in acyclic sports, and even more in sports games has not received a convincing justification (Seluyanov et al., 2012; Sarsania et al., 2019).

In football, the same average heart rate can be registered in different forms of competitive activity. For example, a player can run at a maximum speed of 10-20 m and repeat a fast run at intervals of 30-45 s. In this case, the average heart rate is 130-160 beats/min. If you increase the segment length to 50-80 m, slightly reduce the intensity and increase the rest interval to 60-90 s, you will get the same heart rate. When performing a steady run with heart rate at the level of aerobic or anaerobic thresholds, you can record the same heart rate. Note, however, that the physiological effect will be different. In the first case, when running is performed at maximum speed, all muscle fibres are involved in the physical work, in general, the muscles are slightly acidified, so there is a significant increase in aerobic and speed-strength abilities. In case of running at the level of the aerobic threshold, the training effect is zero, because only oxidative muscle fibres (MB) are recruited, about 1/3 of their total number, and these MB are already developed to the limit (marginal ratio between myofibrils and mitochondria).

Thus, to classify the load according to the pulse is incorrect. It is reasonable to register the pulse for one purpose only - to record the degree of the load influence on the myocardium (Sarsania et al., 2019).

It has been found out that performing loads with a heart rate of more than 180 beats / min and those lasting more than 30 s, as well as participation in several games a week, cause "diastole defect" in the myocardium among young athletes (Helsen et al., 2010; Efimov, 2011).

Moreover, common practice of using "squares" in football as a means of special physical training can be added. When used even once a week, it will lead to dystrophic phenomena in the myocardium in 1-2 months of regular exercise, reduced aerobic capacity and increased likelihood of muscle injury due to deterioration of their ability to relax (Meerson et al., 1988; Godik, 2009).

Particular attention should be paid to this issue when planning loads during pubertal or post-pubertal physical development of adolescents, when children develop the cardiovascular system and, above all, the myocardium lags behind the development of their musculoskeletal system relax (Meerson et al., 1988; Capranica et al., 2001).

Despite the position of Sarsania, Sarsania and Seluyanov (2019), it is worth noting that there is still no consensus among football experts on the basis of which indicators control and planning of training loads should be carried out. This is explained by the fact that most motor tasks in games are complex, i.e. they simultaneously improve the conditioned

motor skills as well as technical and tactical skills of athletes (Godik et al., 2010).

For these purposes, as Godik (2009) has noted, indicators of time for certain types of training are used, but most of the tools applied in training do not have a pronounced effect (Morcillo et al., 2006). Therefore, it is very difficult to assess the direction of training sessions and tasks correctly.

Therefore, in the current situation it is advisable to plan and control training loads in their predominant direction, taking into account the mechanisms of energy supply, which in their turn are divided into anaerobic (lactate and glycolytic), aerobic-anaerobic and aerobic (Nistratov, 2011; Iordanskaya, 2013; Sonkin et al., 2018).

This way, firstly, allows you to determine the degree of load impact on the athlete's body accurately, and thus reduce the factors of fatigue and overexertion, and even more overtraining, which in its turn allows you to manage the development of training skills effectively. Secondly, on the basis of motor tasks systematization it is possible to unify the work supervision according to indicators of time and influence of certain motor tasks (Lalakov, 2000; Suchilin et al., 2005; Varyushin, 2007).

Conclusions

1. Early specialization, intensification of training and competitive activity at the background of a low initial level of children's health, impose high demands on the functional capabilities of their growing body, which in its turn results in an increase in morbidity and, as a consequence, premature cessation of sports (Orlovskaya, 2000; Kaminska, 2016).

2. It is necessary to reconsider the traditional views on the process of training a sports reserve, as the coach must successfully manage the process of an athlete's training rather than the process of sports training (Mikhailova, 2009). Such training should be based on the wide use of game-playing tasks that correspond to the specifics of the chosen sport, which are performed in the optimal mode of individual capabilities with an emphasis on the development of the game intelligence of young football players (Ponomarenko, 2005; Verheijen et al., 2017; Wein 2018).

3. The existing system of conducting children's competitions leads to a contradiction between training and competitive activities (Nikolaienko, 2017). The focus on "results" leads to forcing of training process with an emphasis on physical fitness; as a result, it leads to premature depletion of the child's body, exacerbation of diseases and injuries, as well as to the limitation of the technical and tactical potential of young football players (Stratton et al., 2004; Nikolaienko, 2014). At the same time, it has been established that starting from taking up systematic sports activities and until reaching the highest achievements in sports, the competition system should be subordinated to the training system in the way of gradual development of the young football players' versatile qualities (Platonov, 2013; Nikolaienko, 2015).

4. Optimization of the training process, especially at the initial stages of training, should be based on an understanding of the need to individualize the training process, as far as it should not be based on smoothing out individuality, but rather on the development of the body's strengths (Platonov, 2013; Guba et al., 2015). In the training process that involves young football players, it is necessary to apply motor tasks aimed at developing certain conditioning abilities related to real play; as well as to improve the conditioning abilities prevailing among

other player's skills; to create such a structure of physical fitness activities, in which all components have a harmonious balance. The optimal structure of a football player's physical fitness should be referred to as such a level of development of individual conditioned motor qualities, and such a ratio between them, that allows an athlete to realize the potential accumulated in training sessions and achieve stable sports results most successfully (Stepanov, 2010).

5. The of young football players' physical training is due to the high-quality organization, planning and control over training loads, where the choice of training influences should be based on the fact that playing football is not only about endurance, strength, speed, technical skills, mental qualities or indicators of heart rate, distance overcome, kilograms or minutes (Stolen et al., 2005; Godik et al., 2010; Seluyanov et al., 2012; Bujnovky et al., 2019; Sarsania et al., 2019). These

factors alone do not say anything about the football skills of the players. It is important how a football player reacts to various game situations and how he/she solves them. This is the main criterion for assessing the skill in football (Ponomarenko, 2005; Szczepanski, 2015). Hence, the children's coach must choose the right training means, taking into account the individual capabilities of the child's body, which first of all, presuppose creating such game situations that will stimulate the players to perform actions better, more often, or faster (Michels, 2013; Table 1). A coach should especially carefully approach the planning of loads during the period of puberty or post-pubertal physical development of adolescents, when the development of the cardiovascular system and, first of all, the children's myocardium lags behind the development of the musculoskeletal system (Meerson et al., 1988; Capranica et al., 2001).

Table 1. Means of regulating focus of training load (Michels, 2013)

Means	Effect
Reducing the size of the game space	Less time to make a decision in a certain game situation
Increasing the size of the game space	More time, longer distance to run and pass the ball
More rivals	Less time, harder to "read" the game
Fewer rivals	More time, harder to "read" the game
Pressure on the opponent	Less time, harder to "read" the game
Using the out-of-play position	Less space, less time
Enough balls outside the playing field	Continuous game
Score balls only with the head	Playing through the flanks and much game with the help of head
Time limit (play only 5 minutes or last minute)	Players are forced to attack more effectively, fight for the ball, control the ball and so on

The listed aspects of young football players' physical training will optimize the process of managing the level of their fitness development, which in its turn will reduce the factors

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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