

# Physical quality of body quickness under ecological and biological well-being

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**Abstract.** Regular physical activity is very important for the development of various physical qualities in humans. The process of formation of the quality of speed largely determines the success of a trainee in many sports. Assessment of its formation at age can help in effective training of different categories of athletes, including in game sports. Objective: to determine the course of quickness formation in athletes of game sports. Eighty-four male athletes were observed: adolescent and youth athletes. Soccer, volleyball and basketball players were observed during the study. Groups of 12 adolescents and 14 young men who had not previously participated in sports served as controls. The physical quality of speed was assessed in the 30-meter running test. Student's t-criterion was calculated. Soccer players had the highest speed among the sports specializations taken into account. They possessed more speed than volleyball and basketball players. The physically untrained had the weakest speed capabilities. The growth of quickness in adolescence compared to its level in adolescents was traced as they matured. The highest speed was possessed by soccer players among those examined. They showed greater development of quickness than volleyball and basketball players. As the age increased, quickness increased in all groups of observation. Key words: physical ability, quickness, soccer, volleyball, basketball, physical training.

## 1 Introduction

The steady development of sports science is largely aimed at achieving the maximum mobilization of all the athlete's capabilities, the efforts of his training for his effective participation in competitions [1,2]. Earlier works on the basis of university physical culture and sports practice prove that there are several moments that can inhibit the involvement of young people in regular sports activities [3,4]. It is connected in many respects with insufficiently full realization of a set of possible actions promoting development of different kinds of sports and significant realization of physical abilities of sportsmen [5,6]. The leading among them can be considered the development of material and technical base for each type of sport and the existing requirements to it (frequency during the week of

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sports training, the formation of a productive scheme); planning of training load for students; training means used in the work; the schedule of competitions, the qualification of the involved coaches, the current organizational structure of the sports organization [7,8,9].

Especially significant for the science and practice of sport is the achieved level of abilities, their dynamics and the potential for the development of basic physical abilities in trainees of different ages and especially young people studying at university [10]. The work of the coach and physical education teacher who educate physical educators and athletes is very important here. Nowadays, different sports are especially actively developing, especially among young people. Unfortunately, despite the importance of the issue, there is no whole complex system, physical development of student youth in many sports in higher education [11]. At the same time, it is recognized that physical activities are an effective option for physical development of the body and including: strength, agility, agility, coordination, quickness in a changing environment while maintaining self-confidence [12]. For this reason, they recognize the need for a reasonable combination of traditional means of physical education and sports in future specialists, which will improve their professional development in all respects [13].

For effective physical education of young people there is a wide range of means and approaches for activities for the purposeful improvement of physical properties, movement skills and providing applied physical training in accordance with the profile of the specialty [14]. An important role in the course of physical education of young people is to ensure high motor effect in different variants of sports specialization, participation in training and obtaining significant sports achievements [15].

A serious feature of youth sport is considered to be its dependence on the educational activities of the trainees [16]. In this regard, it is clear that sports activities in all categories of youth lead to a clear fusion of the phenomena of basic physical training and applied sports with the exit in some cases to the sport of higher achievements [17]. The regularity of activities of sufficient intensity is very effective in the consolidation of sports skills [18].

At present, sport has firmly taken its place among the means of youth development, options for strengthening their physical fitness, increasing their efficiency and activating their intellect [19].

Training in any sport should be feasible, sufficient in time and regular, so that the effectiveness of training can be ensured. A set of exercises used that promote physical development can quickly and effectively ensure the growth of the physical capabilities of the trainees [20]. Because of the feasibility of effective exercises, consideration and application of many aspects of the athlete's activity [21]. Training sessions should be conducted taking into account the available specificity of the chosen sport, using available means for sports training, if possible to individualize the course of training and influence the level of motivation and the desire for sports development [22].

The development of physical parameters in the conditions of sports activity is recognized as a leading problem. The study of its aspects remains extremely significant in theoretical and practical terms for sports science [23]. The development of physical qualities occurs in many ways individually and is possible throughout a person's life. This process can be corrected in the course of feasible and regular physical loads within any sport [24].

A long process of research has made it possible to find out that in ontogenesis the sensitivity of body systems to environmental factors fluctuates and, of course, to muscle loads that have a stimulating effect on the body [25]. In this regard, it is very important to clarify the dynamics of different physical parameters in novice athletes as they grow up. This can help to create the most appropriate conditions to stimulate athletes' physical capabilities and enhance their performance. The clarification of these dynamics is possible

through further research on the natural change of ontogenesis periods under conditions of physical activity [26].

In the course of physical training at an early age, there is a versatile development of a person with accelerated development of his physical capabilities. It is clear that their dynamics is of great importance for achieving sports results and optimizing the overall development of the organism [27].

It is recognized that adolescence and young adulthood is characterized by high physical performance, meaningfully activated by physical training with rapid adaptation to loads[28]. This is due to the fact that in the young body is very high resistance to muscle activity. Of great interest in this regard is the evaluation of the age-related development of the quality of quickness in adolescents and young men during sports[29]. This is important for building the process of training activities, allowing to achieve a significant result without the danger of dysfunction and initial manifestations of any diseases in trainees, including in game sports.

Objective: to determine the course of formation of quickness in athletes of game sports.

## **2 Materials and methods**

We observed 84 male athletes of different ages, including adolescents with sports experience of not shorter than 1 year and young men with sports experience of not shorter than 2 years. They made up several groups: adolescent soccer players (14-15 years old) - 15 individuals, adolescent soccer players (18-19 years old) - 14 individuals; adolescent volleyball players (14-15 years old) - 13 individuals, adolescent volleyball players (18-19 years old) - 15 individuals; adolescent basketball players (14-15 years old) - 12 individuals, adolescent basketball players (18-19 years old) - 15 individuals. In addition, two groups of physically untrained individuals (control) were collected: adolescents (14-15 years old) - 12 individuals and young men (18-19 years old) - 14 individuals.

The development of quickness was determined in the course of the 30-meter running test.

The results obtained during the test were processed by Student's t-criterion.

## **3 Results and discussion**

The expression of the development of the quality of quickness largely determines the effectiveness of athletic activity in game sports. Speed characteristics of an athlete are very significantly related to the functional features of his nervous system and musculoskeletal apparatus [30].

The data found during the work are available in the table 1 below.

The highest speed was available in soccer players. Their capabilities were higher than volleyball and basketball players in adolescence by 12.8% and 23.4%, respectively. In the adolescent age groups, the differences were higher, while the advantage of soccer players was maintained. The differences at this age were 9.5% for soccer players compared to volleyball players and 23.8% compared to basketball players. In both age categories of athletes, basketball players had the lowest speed characteristics ( $5.8 \pm 0.61$  s in the adolescent group and  $5.2 \pm 0.42$  s in the youth group). At the same time, in soccer players there were pronounced differences in speed from the level of untrained individuals of control groups. They reached 48.9% in adolescents and 47.6% in the group of youth.

**Table 1.** Development of the quality of quickness in athletes

Groups under consideration	Teenage athletes, M±m	Youth athletes ages, M±m
Duration of running for 30m in groups of soccer players, s	4.7±0.53	4.2±0.42 p<0.05
Duration of running for 30m in groups of volleyball players, s	5.3±0.47	4.6±0.54 p<0.05 p <sub>1</sub> <0.05
Duration of running for 30m in groups of basketball players, s	5.8±0.61 p <sub>1</sub> <0.01	5.2±0.42 p<0.05 p <sub>1</sub> <0.01
Duration of 30m run in control groups, s	7.0±0.35 p <sub>1</sub> <0.01	6.2±0.32 p<0.05 p <sub>1</sub> <0.01

Note: p - significance of age changes, p<sub>1</sub> - significance of differences from the index of soccer players.

In the case of assessing the age-specific features of the level of quickness, an increase in this parameter was found in young men compared to adolescents. In all the collected groups, there were differences in the development of the quality of quickness between groups of adolescents and groups of young men. In the sample of soccer players there was a decrease with age in the index of running for 30m by 11.9%, in basketball players by 11.5%, in volleyball players by 15.2%, and in the control by 12.9%.

The development of speed capabilities in trained compared to their level in physically inactive observed at both ages can be associated with the fact that regular physical activity increases the quality of speed due to a number of physiological mechanisms [31]. This is associated with the intensification of biochemical processes in nerves and muscles and activation of information transfer between individual neurons, the growth of overall activity of nerve tissue, more active transfer of excitation from nerve to muscle, acceleration of information processing in the cortex of the greater hemisphere [34]. At the same time, different categories of athletes increase their physical reserves in different ways as a result of regular training [34]. The increase in physical reserves is provided by strengthening the musculoskeletal apparatus of the body in response to regular physical activity during the performance of physical exercises specific to the chosen sport [35].

Regularly repeated properly constructed physical activity is an effective stimulator of the whole organism [36]. Strengthening of the function of transverse striated muscles of the limbs and the body activates all manifestations of metabolism and hemocirculation in internal organs and intensifies the repair of their tissues [37]. In active muscles, the number of wide-open capillaries increases, which provides intensive blood supply. In this regard, under conditions of high activity of skeletal muscles, they receive a large amount of oxygen and more nutrients [38]. In this situation, the synthesis of proteins of different purposes increases in the musculoskeletal system and the formation of macroergens increases [39]. This situation contributes to the growth of muscle tissue mass, increasing its strength characteristics by increasing the number of its fibers [6].

It has been observed that systematic muscular activity, realized as much as possible, causes a powerful stimulation of all parts of the body [40]. This effect was previously registered in healthy individuals of different ages [8]. No sex differences in the effect of physical activity on the organism were found [3]. The positive effect of regular physical training has also been noted in relation to the dynamics of the human body, which has a risk of pathology and some diseases [19]. In this regard, it is accepted to consider regular rational muscle activity as a variant of strengthening the whole organism, which can be used as a component of comprehensive health improvement [41].

Physical activity as a productive effect on the body restoring its normal functioning at any age. Different types of sports activities involve different muscle groups in the body. At the same time regular game sports in terms of general toning and strengthening of the organism of young men are poorly studied. The influence of different variants of regular playing sports in adolescence remains unclear. Previously, the general strengthening capabilities of this variant of physical activity were noted without significant specificity in relation to the dynamics of different body parameters at different ages[42].

At a young age, there is often an interest in sports activities to improve various physical qualities [5]. It is very important for science and especially for the practice of sports to find out the influence of different types of martial arts on the quality of human quickness. In this regard, we compared the features of physical qualities of soccer players, volleyball players and basketball players of adolescence and youth. The work clarified the possibilities of representatives of these species in terms of the development of the quality of quickness.

Earlier it was found out that in the organism under conditions of physical exertion changes associated with strengthening and health improvement occur. It became clear that they provide a bright health-improving effect [43]. However, it was not clear how the quality of quickness, which is extremely important for representatives of different specializations of game sports, is formed.

High development of the muscular system, cardiovascular system and respiratory system on the background of regular sports training ensured an increase in the level of quickness of the trainees as they grew older. This was most pronounced in soccer players. Apparently, this physical activity increased the intensity of work of all internal organs to the greatest extent in humans.

Functionally very significant mechanism of increasing the speed in young organism during training in sections of playing sports can be strengthening of cardiovascular system parameters [44]. The highest level of quickness in soccer players should be associated with the best conditions for intensification of oxygen supply to the cells of the body [20]. Apparently, regular soccer activities most of all increase blood flow through capillaries, normalize vascular tone and optimize blood rheological properties compared to volleyball and basketball players. It is also clear that in the case of strengthening muscle activity due to soccer, young men strengthened the heart muscle to the greatest extent compared to adolescents with a very favorable weakening of hemostasis parameters, which stimulated the course of hemocirculation in all tissues [45].

Running acceleration in soccer players is largely due to the activation of the nervous system and transverse striated leg muscles during systematic soccer loads [3]. Acceleration of running in soccer players is also associated with an increase in the stability of their body during running, provided by a significant strengthening of the vestibular apparatus [4]. The functionally very favorable changes found in the course of the study in adolescence in comparison with adolescence are caused by a pronounced stimulation of the limb muscles in the course of playing sports and especially soccer. It is clear that these regular activities are an effective option to stimulate whole-body vascular tone and myocardial development [22].

The evidence found in this study suggests that regular physical activity within game sports can stimulate human physical capabilities, normalize vascular tone, and increase metabolism. The performed work provided elimination of the previously existing gaps in the system of scientific knowledge, fully confirming the known knowledge. The carried out observation spoke about the important health-improving potential of regular game sports, increasing with age in young men in comparison with adolescents. Considering the obtained data, it can be considered that regular playing sports and especially soccer can strengthen the heart and lead to the growth of physical abilities of adolescents and young men.

Taking into account the data already known to science and the facts clarified in the conducted observation, it became clear that the elasticity and strength of muscles, especially of the lower limbs, and the degree of joint mobility increases in soccer players as much as possible in comparison with volleyball and basketball players [5]. Systematic soccer activities can lead to the greatest stimulation of the synthesis of biologically active molecules in blood vessels and in the cells of peripheral tissues, thus enhancing the vitality of all parts of the body [25]. It is clear that physical activity during judo training creates in the brain of trainees a stable balance of excitation and inhibition phenomena, thus contributing to the normalization of sympathetic and parasympathetic activity, activating trophic phenomena in all tissues. Apparently, the expression of these processes exceeds the analogous processes in the organism of basketball and volleyball players [8].

## 4 Conclusion

The growth of physical parameters in the process of physical exertion in the framework of different sports is now considered particularly closely. Clarification of its moments is very significant for the theory and practice of sport. Building up of physical capabilities is realized in many respects individually and occurs throughout human ontogenesis. This process can be corrected by adequate regular physical activity in different sports. It is noticed that in the course of life the level of sensitivity of different parts of the organism to the action of factors from the outside, including muscle loads, may change. Therefore, it is necessary to accurately find out the changes in physical characteristics in trainees, especially at a young age. This can help to form for athletes the most suitable conditions for the development of their organism, which can help to achieve high sports results. It is very important in this case is to track the age dynamics of physical capabilities of a person. Especially important is the quality of quickness, which is considered to be very significant for regular sports activities. In the conducted work it was found that the most pronounced speed capabilities from among the game sports, undergoing regular training, possess soccer players. According to this parameter they surpassed volleyball and basketball players. In the course of regular maturation, an increase in the expression of quickness was noted in all observed individuals, including representatives of game sports and all physically untrained individuals.

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