

PHYSICAL READINESS AND PERFORMANCE OF ADOLESCENTS OF DIFFERENT SOMATOTYPE

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Annotation. *Purpose:* to investigate the rate of puberty, changes in indicators of physical fitness and physical activity at the same somatotype different boys in the age range from 11 to 14 years. *Material:* 123 teenager were examined. The values of the studied parameters were determined at the beginning of each new school year. Tests were used to assess the major conditional qualities and coordination abilities. *Results:* the overall physical performance of boys of macrosplanchnic somatotype characterized annual trend towards improvement, except for the period between 11 and 12 years. Significant differences are typical for physical performance, except asthenoid and macrosplanchnic somatotype. Typological features installed due to changes in the studied parameters. *Conclusions:* noted the need to consider the data in shaping the content of physical education in improving orientation.

Keywords: teens, somatic, physical, fitness, performance.

Introduction

The offered by school physical education program [8; 10] indicators for differentiation of means and methods are rather variable by their characteristics under influence of external factors [2; 12], i.e. they only partially reflect individual features of teenagers. At the same time, researchers [7; 14; 15] point at indicators, which, being genetically determined, practically do not change; they are the so-called genetic markers and one of them is somatic type. To day it is widely used in sport practice as a prognosticating indicator of motion abilities of an individual [5; 9; 13], in practical medicine it is used as indicator of bent to certain disease [6]. Besides, we stated substantial differences in value and dynamic of morphological functional indicators, physical abilities, peculiarities of training and physical health. Alongside with it complex researches in this direction are rather rare [11]; concerning application of longitudinal method of obtaining of empirical data from teenagers of 11 -14 years old – they are completely absent. In this connection there appears a demand in appropriate research.

Purpose, tasks of the work, material and methods

The purpose is determination of general trends and specificities of changes of some physical condition indicators of 11-14 years old boys with the help of longitudinal studying.

The methods and organization of the research.

In the course of the research we used such methods as: at theoretical level – general scientific (analysis, synthesis, generalization, systemizing); at empirical level – pedagogic (longitudinal, stating experiment, testing, observation), medical-biological (somatoscopy, somato-metering, step-ergometry), methods of mathematical statistics. Somatic type of constitution was determined by methodic of Shtefko-Ostrovskiy in modification of S.S. Darskaya [1; 3]. We examined 123 teenagers (25 of asthenoid somatic type, 45 – of thoracal type, 33 – of muscular and 20 – of digestive somatic type) – pupils of OU of Kamenetsk Podolsk. All they were 11 years old by the beginning of experiment. The values of examined indicators were determined at the beginning of every academic year with the help of test-battery for evaluation of main conditional features, which corresponded to modern metrological requirements. Such tests were: 6 minutes run at maximal distance (general endurance), 100 meters' run (speed endurance), hanging on bent arms (static power endurance), 20 meters' run (speed power), 5 seconds' run on the spot at maximal temp (frequency of movements), long jump from the spot (explosive power in jumps), throwing of heavy ball from sitting position (explosive power of throwing) standing dynamometry (absolute strength of back extensors,, forward bent in sitting position (mobility of lumbar spine), turn of ruler behind back (mobility of shoulder joints) shuttle run 4x9 (coordination in cycle motions) throwing of tennis ball at maximal distance by left and right hands (coordination in ballistic movements for distance). Three forward rolls over (coordination in acrobatic motions). Physical workability was determined by step-ergometry (methodic of V.L. Karpman [5]).

Results of the research

Physical fitness and workability. Annually only boys of asthenoid somatic type showed general and static endurance: the increment of the first from 11 to 12 years old age was 3.8 %, from 12 to 13 – 10.5 %, from 13 to 14 – 9.3 %, the second, accordingly: 35.1, 29.1 and 53.9 % ($p < 0.01 \div 0.001$). at the same time mobility of shoulder joints worsened with every year: from 11 to 12 years old age – by 12.2 %, from 12 to 13 – by 9.3 %, from 13 to 14 – by 7.3 % ($p < 0.05 \div 0.01$). Changes witnessed about increasing of absolute muscular force by 15.3 % in the age from 11 to 12 years old, by 14.1 % from 12 to 13 years old and about trend to improvement in the following age period. The same dynamic characterized frequency of movements, explosive power in jumps. Coordination in throwing for distance by both hands, speed endurance, but with the following specificities: improvement was significant accordingly from 12 to 14 years old age; from 11 to 12, from 13 to 14; from 11 to 13; from 11 to 12, from 13 to 14; from 11 to 13 years old age. In other periods we stated only positive trend. Dynamic of other physical qualities was remarkable only by differently oriented trend, because changes were not statistically confident.

General physical workability of boys of asthenoid somatic type was characterized by the following changes: from 11 to 13 years old age, every year it had trend for improvement, from 13 to 14 – on the contrary – to worsening;

for the whole period increment was 43.1 kgm.p. min. and reflected only the trend to increasing of the indicator because this increment was not statistically confident. Differences between results of peers of different somatic types were the following: at 11 years old age in astenoid somatic type boys they were substantially lower in comparison with muscular and, especially, thoracal type; at 14 years old – only in comparison with muscular type.

Thoracal somatic type. The following characteristics of physical features' development were determined for boys of this somatic type: from 11 to 14 years old age annual increase of speed, absolute strength, explosive power in jumps, throws, coordination in distant throws by main hand, general and speed endurance; worsening with every year was registered only concerning mobility of shoulder joints: from 11 to 12 years old by 15.3 %, from 12 to 13 – by 9.7 %, from 13 to 14 – by 12.0 % ($p < 0.001$). The other physical features were characterized by changes in both sides and were statistically confident. Mobility of lumbar spine from 11 to 13 years old age improved by 73.9%; after this, it worsened by 26.2%; coordination in throwing for distance by weaker hand from 11 to 12 years old worsened by 20.7%, from 12 to 14 years old it, on the contrary, increased by 71.7%; coordination in acrobatic motions – accordingly: from 11 to 13 years old age – by 17.4%, from 13 to 14 years old – by 10.1%, coordination incyclic motions from 11 to 13 years old increased by 10.9%, from 13 to 14 – reduced by 2.3%; static power endurance from 11 to 12 years old reduced by 14.1% and after this, it increased every year reaching for this period 44.6 % ($p < 0.001$ – 0.001). Dynamic of movements' frequency was the following: from 11 to 12 years old increased by 18.6 %, from 12 to 13 – it reduced by 8 % ($p < 0.001$), from 13 to 14 years old – result did not change.

General physical workability from 11 to 14 years old age practically did not change, because its worsening was only 30.3 kgm.p.min. ($p > 0.05$), and annual change of indicator witnessed about trend for improvement in period 11–13 years old and to worsening – in period from 13 to 14. Differences in indicators of boys of different age groups are the following: at 13 years old age in thoracal somatic type it is significantly lower than in muscular; in other cases it practically does not differ.

Muscular somatic type. From 11 to 14 years old age, with every year absolute strength of boys improved; total increment was 38.1 %. Annual improvement of explosive power in jumps ensured its increment by 32.8 %, in throwing – by 44.1 %, in coordination in throwing for distance by main hand – by 75.3 %, by weaker hand – by 82.7 %, in static power endurance – by 71.4 % ($p < 0.001$). With it the most positive changes were registered from 11 to 12 years old age, the most minimal – from 12 to 13 years old age. Improvement of speed endurance was in period from 11 to 13 years old (5.0 %), but at the most rapid rate – from 12 to 13 years old and was 4.1 % ($p < 0.001$). At the same time we registered reducing of mobility of shoulder joints: from 11 to 12 years old – by 9.3 %, from 12 to 13 – by 7.4 %, from 13 to 14 – by 13.4 % ($p < 0.001$). Other examined physical qualities were differently directed: speed power of boys of this somatic type increased from 13 to 14 years old by 20.6 %, from 11 to 13 – on the contrary, reduced by 12.4 %; the same picture was registered concerning general endurance with only one difference – from 11 to 13 years old reduction was 11.3 % ($p < 0.001$), from 13 to 14 – we registered only positive trend (1.8 %; $p > 0.05$). There were also opposite changes in frequency of movement: from 11 to 13 years old it increased by 20.8 %, from 13 to 14 – worsened by 4 %, but in general, for the period of research changes were positive. Similar was the trend of changes of lumbar spine mobility and coordination in cyclic motions: they worsened in period from 11 to 12, from 13 to 14 and improved from 12 to 13; total (for three years) changes were negative: accordingly by 6.6 and 0.42 %. Coordination in acrobatic motion improved: in period from 11 to 12, from 13 to 14 years old age (increment 28.6 %) and reduced (9.8 %) – from 12 to 13 ($p < 0.001$).

General physical workability of boys of muscular somatic type had annual trend to improvement that result in its increasing by 108.7 kgm.p.min. at 14 years old age, i.e. to significant increasing ($p < 0.01$). Concerning differences between results of peers of different somatic type groups we can note the following: at 11 years old age results of the first were significantly higher than of asthenoid type, at 12 years old – higher than of digestive type; at 13 years old age – higher than of thoracal and digestive; at 14 years old – higher than in all other somatic types.

Digestive somatic type. From 11 to 14 years old age only absolute strength and coordination in throwing for distance by main hand increased with every year; their increment for this period was accordingly 45.6 and 59.6 % ($p < 0.001$). At the same time we registered physical qualities, which reduced with every year: general endurance – by 18.9 % (the highest increment was from 11 to 12 years old age by 7.1 %; $p < 0.001$), static endurance – by 70.1 % from 11 to 12, and by 26.4 % – from 12 to 13 years old age ($p < 0.001$).

Other examined qualities were characterized by different changes of indicators, though by similar trend. For example, frequency of movements at age from 11 to 12 years old increased by 14.3 %, after is – on the contrary, reduced by 9.7 % ($p < 0.05$ – 0.001), but in connection with more intensive growth, changes during three years were positive and were 4.6 %. The registered changes of indicator of explosive power took longer time, videlicet: it increased from 11 to 13 years old age and increment was 17.3 %, from 13 to 14 – reduced by 6.8 % ($p < 0.001$).

The same, but of a little other value, was the trend of changes of the following physical qualities: from 11 to 13 years old age lumbar spine mobility increased by 41.6 %, from 13 to 14 – reduced by 16 %; coordination in throwing for distance by weaker hand accordingly increased by 104.2% and reduced by 26.7%; mobility of shoulder joints increased from 11 to 12 years old – by 5.9 %, from 13 to 14 – by 2.6 %, from 12 to 13 – reduced by 4.8 %; coordination in acrobatic movements at age from 11 to 12 increased by 21.8 %, from 12 to 14 – decreased by 18.1% ($p < 0.001$).

A little bit different was dynamic of other (except speed power) of the examined physical qualities – from 11 years old age they worsened and only in the next period they demonstrated positive trend, which characterized by unconfident increasing of indicators. For example explosive power in throwing at age from 11 to 12 years old reduced by 8.7 %, then it increased by 45 % ($p < 0.001$). Coordination in cyclic movements reduced in period from 11 to 12 years

old and from 13 to 14 years old accordingly by 2.5 and 3.8 %, from 12 to 13 – on the contrary, increased by 5.2 %, That finally resulted in practical absence of indicator's changes. Speed endurance worsened in age from 11 to 12 years old – by 9.3 %, from 13 to 14 – by 3.7 %, and increasing, at age from 12 to 13 years old age was only 3.7 %, that finally result in substantially worse indicators comparing with 11 years old age. Concerning speed power, its change at age from 11 to 14 years old was characterized by positive trend, except period of 12-13 years old age, during which it practically did not change, while its increasing for all three years period was only 13.3 % ($p < 0.001$).

General physical workability of boys of digestive somatic type was characterized by annual trend to improvement, except period of 11-12 years old age, during which we registered negative trend of this indicator. Alongside with it, its increment in age from 11 to 14 years old age was 66.2 kgm.p.min. that witnessed only about positive trend in age dynamic of this indicator, because its increment was unconfident. Concerning differences between results of peers of different somatic types, the following can be noted: at 12-14 years old age results of digestive type were substantially lower than of muscular somatic type, in all other cases they practically did not differ from other somatic types.

Conclusions:

1. At 11-14 years old age changes of physical fitness of different somatic types' boys are significantly different by quantity of physical qualities, which substantially improve (or worsen, or remain unchanged), by content of these qualities and their increment in certain age of certain somatic type. Substantial differences are characteristic also for physical workability, with the exception of asthenoid and digestive somatic types, results of which practically do not differ between each other.

2. Changes of physical fitness indicators of different somatic types' boys substantially differ from registered without their consideration. It conditions demand in consideration of somatic types, when determining optimal parameters of health related physical loads.

The further researches shall be directed to development of health related physical loads' parameters for boys of different somatic types and experimentally test their effectiveness in solution of the set tasks.

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