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Status of physical development of teenagers from 11 to 12 years of basic medical group during the school year

Abstract. Purpose: to define the changes age of anthropometric indexes of girls and boys from 11 to 12 years of basic medical group. **Material and Methods:** pedagogical research (somatometry and somatoscopia) of teenagers is conducted from 11 to 12 years (girls 79; boys 91) of basic medical group of Kharkov general schools. **Results:** the features of physical development of teenagers are Set from 11 to 12 years of basic medical group at the beginning and at the end of school year. The amount of teenagers is determined with the basic type of carriage, flat and plain-concave, round and stoop back. **Conclusions:** the state of morphological indexes of teenagers is certain from 11 to 12 years of basic medical group. The changes of types of carriages are educed for girls and boys of basic medical group for a school year.

Keywords: basic medical group, anthropometric indexes, types of carriages.

Introduction. Physical development is the natural process of aged changes of morphological and functional features of an organism caused by hereditary factors and specific conditions of the environment [10].

According to experts, the hereditary program of the development of a person includes a determined (that is a constant, a invariable) and a variable parts which provide, first of all, continuation of the human race, and also inclinations of a person as a representative of the human race, namely – language, transmission, labor activity, thinking, on the second, the development of systems which help a human body to adapt to variable conditions of its existence [2; 9].

During the independence of Ukraine the distribution of functional deviations made at children and teenagers: 34% – cardiovascular; 22% – visually touch; 21% – endocrine and exchange; 16% – psychological; 13% – bone and muscular [6].

According to the researches of the Ukrainian experts, 36,4% of pupils of comprehensive schools have the low level of physical health which leads to different diseases of systems of an organism [1; 2]. During a study at school diseases of cardiovascular system were found at 20–23% of pupils, 19–24% – respiratory, 17–19% – digestive, 12–17% – visually touch, 9–13% – bone and muscular and 7–11% – nervous systems of an organism, and, as a result, a big percent of admissions of lessons at school [4; 13].

At the same time consequences of different social factors and a non-use of conditions of physical training, especially during the periods of the growth and the development during the certain aged periods (at children in 6–7 years old; in 11–13 years old at girls and in 13–15 years old at boys) which fall on the school period are the reasons of an emergence of these deviations [8].

The school age is one of the difficult periods of the aged development of a human body who covers time from childhood to youth and is characterized by a certain complex connected among themselves and the environment of morphofunctional properties of an organism [3; 10].

According to preventive medicine and experts in the sphere of physical training it is determined that during the period from 1991-1995 till 58% of children and teenagers entered into the first medical group (main) during a study at school, from 1996-2000 – till 41%, from 2001-2004 – till 25%, and from 2005-2014 – till only 18% [4].

Also it is noted that there are 11% of healthy pupils at school totally on the termination of the eleventh class, with pathological diseases – 49% and 40% in the group of risk. The growth of alcoholism, drug addiction, infectious diseases, hypokinesia is the reasons of a low percent of healthy pupils. The prompt development of information technologies which also considerably reconstructs a vital space of children and teenagers is observed and causes the number of morphological, functional and psychological consequences in recent years [2].

It is counted that on average eight hours per day “are excluded” one of the important systems of an organism – the musculoskeletal device at children and teenagers in the aged period from 9 till 16 years old, and, as a result, this immobility can't tell on morphological features, and further and on physical development. Researchers defined that 63-72% of teenagers have violations of a bearing and at 10% – scoliosis or curvature in the sagittal plane during the pre-pubertal and pubertal periods [5]. Therefore timely physical training will promote strengthening of health and mastering the vital movement skills and abilities and reach high performance.

In this regard we conducted pedagogical researches of the age changes of anthropometrical indicators of teenagers of 11 and 12 years old of the main medical group within a year.

Communication of the research with scientific programs, plans, subjects. The research is conducted according to the thematic plan of the research work in the sphere of physical culture and sport for 2011-2015 of the Ministry of Ukraine for family, youth and sport on a subject 3.8 “Theoretic-methodological bases of the creation of system of mass control, the assessment of the level of development and physical fitness of different groups of the population” (No. of the state registration is 0111U000192).

The aim of the research consists in the definition of age changes of anthropometrical indicators at girls and boys from 11 till 12 years old of the main medical group.

The tasks of the research:

- to carry out the analysis of the level of health of children and teenagers;
- to define changes of morphological indicators of teenagers from 11 till 12 years old within an academic year;
- to reveal age changes of types of bearing at girls and boys at the beginning and at the end of the academic year.

The material and methods of the research: analysis of scientific and methodical literature; pedagogical research (somatometry and somatoscopy) teenagers from 11 till 12 years old (girls 79; boys 91) of the main medical group of Kharkov comprehensive schools; assessment of physical development (the centile method); methods of mathematical statistics.

Results of the research and their discussion. The complex assessment of health is carried out according to four criteria: a level of a functional condition of the main systems; a degree of resistance and reactivity of an organism; a level of physical and psychological development and a degree of its harmony; an existence or an absence of chronic pathologies [5].

Morphological properties of girls and boys from 11 till 12 years old of the main medical group were defined by us for the establishment of the age physical development.

The conducted researches testify that anthropometrical indicators at girls grew in a body length by 3,8 sm ($t = 1,99$; $p < 0,05$), a body weight on 4,2 kg ($t = 2,00$ $p < 0,05$), head circles on 0,4 sm ($t = 0,92$; $p > 0,05$), a humeral diameter on 0,5 sm ($t = 1,02$; $p > 0,05$), thorax circles on 3,0 sm ($t = 1,34$; $p > 0,05$), thorax circles on an exhalation on 2,5 sm ($t = 0,96$; $p > 0,05$), a length of a spine sitting on 1,3 sm ($t = 0,62$; $p > 0,05$), a femoral diameter on 0,8 sm ($t = 1,48$; $p > 0,05$), an external size on 1,2 sm ($t = 0,64$; $p > 0,05$) within an academic year (tab. 1).

Table 1

Dynamics of anthropometrical indicators of girls of 11 and 12 years old of the main medical group during an academic year (n = 79)

Indicators	At the beginning		At the end		Assessment of statistical validity	
	$\bar{X}_1 \pm m_1$	σ_1	$\bar{X}_2 \pm m_2$	σ_2	t	p
Body length, sm	145,4+1,39	12,32	149,2+1,32	11,69	$t_{1,2}=1,99$	$p_{1,2}<0,05$
Body weight, kg	37,7+1,66	14,66	41,9+1,26	11,15	$t_{1,2}=2,00$	$p_{1,2}<0,05$
Head circles, sm	52,5+0,24	2,13	52,9+0,40	3,51	$t_{1,2}=0,92$	$p_{1,2}>0,05$
Humeral diameter, sm	32,5+0,27	2,42	33,0+0,43	3,83	$t_{1,2}=1,02$	$p_{1,2}>0,05$
Thorax circle, sm	72,5+1,53	13,54	75,5+1,64	14,50	$t_{1,2}=1,34$	$p_{1,2}>0,05$
Thorax circle on an exhalation, sm	72,4+0,75	6,60	74,9+2,23	19,67	$t_{1,2}=0,96$	$p_{1,2}>0,05$
Length of a spine sitting, sm	56,4+1,61	14,19	57,7+1,30	11,45	$t_{1,2}=0,62$	$p_{1,2}>0,05$
Femoral diameter, sm	26,1+0,67	5,90	26,9+0,62	5,49	$t_{1,2}=1,48$	$p_{1,2}>0,05$
External size, sm	77,7+1,24	10,92	78,9+1,45	12,81	$t_{1,2}=0,64$	$p_{1,2}>0,05$

Note. A length of a spine sitting – is from C7 to a chair plane; ES – is a height of a big spit from a floor.

While indicators of length and body weight increased on 2,6 sm ($t = 1,45$; $p > 0,05$) and 2,2 kg ($t = 0,85$; $p > 0,05$) at boys from 11 till 12 years old within an academic year (tab. 2).

Table 2

Anthropometrical indicators of boys of 11 and 12 years old of the main medical group during an academic year (n = 91)

Indicators	At the beginning		At the end		Assessment of statistical validity	
	$\bar{X}_1 \pm m_1$	σ_1	$\bar{X}_2 \pm m_2$	σ_2	t	p
Body length, sm	139,5+1,29	12,28	142,1+1,19	11,27	$t_{1,2}=1,45$	$p_{1,2}>0,05$
Body weight, kg	31,0+0,34	17,40	33,2+0,40	17,08	$t_{1,2}=0,85$	$p_{1,2}>0,05$
Head circles, sm	52,6+0,33	3,26	53,1+0,43	3,78	$t_{1,2}=0,90$	$p_{1,2}>0,05$
Humeral diameter, sm	32,8+0,87	8,27	34,9+0,34	3,26	$t_{1,2}=2,24$	$p_{1,2}<0,05$
Thorax circle, sm	66,8+1,63	15,60	69,6+1,47	13,99	$t_{1,2}=1,30$	$p_{1,2}>0,05$
Thorax circle on an exhalation, sm	65,2+0,95	8,98	68,7+0,30	2,85	$t_{1,2}=3,50$	$p_{1,2}<0,001$
Length of a spine sitting, sm	56,1+1,18	11,21	57,8+0,94	8,89	$t_{1,2}=1,14$	$p_{1,2}>0,05$
Femoral diameter, sm	24,2+0,14	4,76	24,3+0,17	3,82	$t_{1,2}=0,18$	$p_{1,2}>0,05$
External size, sm	76,9+0,45	4,25	77,4+0,21	1,97	$t_{1,2}=0,64$	$p_{1,2}>0,05$

Statistical distinctions aren't defined in indicators of a circle of a head and a thorax, a length of spine sitting, a femoral diameter, an external size ($p > 0,05$), while indicators had an essential difference in a humeral diameter and a circle of a

thorax on an exhalation ($p < 0,05-001$).

The assessment of physical development by means of anthropometrical data was carried out nonparametric methods (the centile method). At the beginning of an academic year at girls indicators of length and body weight, a circle of a head corresponded to the average physical level (the zone No. 4 from the 25th to the 75th centile), circles of a thorax are higher than an average (the zone No. 5 from the 75th to the 90th centile) whereas at the end indicators of a circle of a head corresponded to level below an average (the zone No. 3 from the 10th to the 25th centile), thus other centile zones didn't change according to the received indicators.

During an academic year physical development of children from 11 to 12 years old satisfied the zones No. 4 from the 25th to the 75th centile (LB, CT) and the No. 3 from the 10th to the 25th centile (WB, CH) and had an average and below an average level.

It means that the harmonious physical development is defined at the beginning of the research at all teenagers of the main medical group. At the end of the academic year at girls a difference between centile zones (CT – the No. 5 from the 75th to the 90th centile; the No. 3 CH from the 10th to the 25th centile) made two intervals that testify to an imbalance in an organism of which demands attention. Boys had more stable fourth and third centile zones, but their level is low (75% the zone No. 3, 25% the zone No. 4).

The somatoscopic researches conducted at the beginning showed that 54% of girls and 55% of boys have the main type of a bearing, 16% and 15% - a flat and plain-concave back, 17% and 12% - a round back, 13% and 18% - a round-shouldered back (tab. 3).

Table 3

Types of bearings at teenagers of 11 and 12 years old during an academic year (girls - 79; boys - 91) (across Shtaffel)

Types of bearings	Being investigated	At the beginning		At the end		During an academic year	
		%	Quantity	%	Quantity	%	Quantity
Main	Girls	54	43	51	41	-3	-2
	Boys	55	50	50	46	-5	-4
Plain-concave back	Girls	16	12	17	13	+1	+1
	Boys	15	14	16	15	+1	+1
Round back	Girls	17	13	17	13	0	0
	Boys	12	11	14	12	+2	+1
Round-shouldered back	Girls	13	11	14	12	+1	+3
	Boys	18	16	20	18	+2	+2

At the end of the research basic indicators of the main type of a bearing decreased till 51% at girls and till 50% at boys and the number of teenagers with a flat and plain-concave back increased till 17% and till 16%, with a round-shouldered back till 14% and till 20% respectively.

Thus, within nine months (academic year) the essential age anthropometrical changes took place: on 3,8 sm in a body length ($t = 1,99$; $p < 0,05$) and on 4,2 kg in a body weight ($t = 2,00$; $p < 0,05$) at girls; on 2,1 sm in a humeral diameter ($t = 2,24$; $p < 0,05$) and thorax circles on an exhalation on 3,5 sm ($t = 3,50$; $p < 0,05$) at boys.

So, in the course of the stating research we received *three groups* of data.

The results of the researches received *for the first time* belong to the first group: it is revealed the disharmonious development in indicators of a circle of a thorax and a circle of a head of girls of 11 and 12 years old of the main medical group at the end of the academic year; the low physical development - at boys of 11 and 12 years old of the main medical group; changes of the main type of bearings at girls and boys of 11 and 12 years old of the main medical group.

Results belong to the second group which *supplement* data of E. V. Bykov (2000), I. D. Glazyryna (2003), L. V. Kvashina (2006), B. M. Shiyani (2002) with the questions connected with the physical development and health studying at school; data of S. B. Tikhvynskyi (1991), S. V. Khrushchev (1991) about changes of anthropometrical indicators of teenagers of the pubertal age; data of A. V. Dolzhenkov (2008), V. A. Kashchuba (2003), A. V. Yuryev (2007) about changes of the musculoskeletal system during the pubertal growth.

The results are referred to the third group which *confirms* scientific data of leading experts (I. A. Arshavsky, 1981; L. V. Volkov, 2002; A. A. Guzhalovsky, 1984, 1986; T. Yu. Krutsevich, 1985, 1999, 2014) that the individual health of children and teenagers is necessary to consider in the course of training at school.

Conclusions:

1. It is established that anthropometrical indicators significantly increased by 3,8 sm ($t = 1,99$; $p < 0,05$) in a length of a body and on 4, 2 kg ($t = 2,00$; $p < 0,05$) in a body weight at girls; on 2,1 sm ($t = 2,24$; $p < 0,05$) in a humeral diameter and on 3,5 sm ($t = 3,50$; $p < 0,05$) in a thorax circle on an exhalation at boys during the age changes (from 11 to 12 years old) during an academic year.

2. For one academic year somatoscopic indicators of the main medical group decreased by 3% of the main type bearing and increased by 1% with a flat and plain-concave and with a round-shouldered back at girls; indicators decreased by 5% of the basic type of bearing and increased by 1% with a flat and plain-concave back, on 2% - with a round back, on 2% - indicators on a round-shouldered back at boys.

3. It is revealed that physical development of teenagers from 11 to 12 years old has changes during an academic year: length and body weight, a circle of a head corresponded to the average level (to No. 4 from the 25th to the 75th centile), a circle of a thorax is higher than an average (No. 5 from the 75th to the 90th centile) at the beginning, and at the end length and body weight corresponded to the average level (to No. 4 from the 25th to the 75th centile), a circle of a thorax is higher than an average (No. 5 from 75 th to the 90th centile), a circle of a head is lower than an average (No. 3 from the 10th to the 25th centile) at girls. A length of a body and a circle of a thorax corresponded to the average level (to No. 4 from the 25th to the 75th centile), a body weight and a circle of a head are lower than an average (No. 3 from the 10th to the 25th centile), and length and body weight, a circle of a head were below average (No. 3 from the 10th to the 25th centile) and the circle of a thorax corresponded to the average level (to No. 4 from the 25th to the 75th centile) at the end at boys.

Prospect of further researches. Further researches will be directed on the determination of functional features of teenagers with various types of bearings.

References:

1. Bulich E. G. *Fizicheskaya kultura i zdorovye [Physical education and health]*, Moscow, 1991, 64 p. (rus)
2. Bykov Ye. V., Isayev A. P., Kharitonova V. I. *Fizicheskaya kultura: vospitaniye, obrazovaniye, trenirovka [Physical culture: education, education, training]*, 2000, vol. 3, p. 46–49. (rus)
3. Glazirin I. D. *Osnovi diferentsiyovanogo fizichnogo vikhovannya [Basics differentiated physical education]*, Cherkasi, 2003, 352 p. (ukr)
4. Tikhvinskiy S. B., Khrushchev S. V. *Detskaya sportivnaya meditsina [Children's Sports Medicine]*, Moscow, 1991, 560 p. (rus)
5. Dolzhenkov A. V. *Zdorovye vashogo pozvonochnika [The health of your spine]*, Moscow, 2008, 208 p. (rus)
6. Kvashnina L. V. *Mistetstvo likuvannya [Art of treatment]*, 2006, vol. 12, p. 74–76. (rus)
7. Kolychev V. A. *Fizicheskaya kultura i sotsialnoye zdorovye naseleniya [Physical culture and social health]*, Moscow, 1998, 112 p. (rus)
8. Krutsevich T. Yu., Vorobyov M. I., Bezverkhnya G. V. *Kontrol u fizichnomu vikhovanni ditey, pidlitkiv ta molodi [Control of physical education of children, adolescents and young people]*, Kyiv, 2011, 224 p. (ukr)
9. Krutsevich T. Yu. *Metody issledovaniya individualnogo zdorovya detey i podrostkov v protsesse fizicheskogo vospitaniya [Research Methods of individual health of children and adolescents in physical education]*, Kiyev, 1999, 232 p. (rus)
10. Krutsevich T. Yu. *Teoriya i metodika fizicheskogo vospitaniya: uchebnik dlya vysshikh uchebnykh zavedeniy fizicheskogo vospitaniya i sporta [Theory and methods of physical education]*, Kyiv, 2003, 423 p. (rus)
11. *Neposredstvennoye obsledovaniye rebenka [The direct examination of the child]*, Saint Petersburg, 2007, 384 p. (rus)
12. Shiyani B. M. *Teoriya fizichnogo vikhovannya shkolnyariv [The theory of physical education students]*, Ternopil, 2002, 252 p. (ukr)
13. Friedman L. S. *Social-environmental factors associated with elevated body mass index in a Ukrainian cohort of children / L. S. Friedman, E. M. Lukyanova, A. Serdiuk et al. // Int. J. Pediatr. Obes. – 2009. – Vol. 4 (2). – P. 81–90.*

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