SOMATIC HEALTH OF SCHOOLCHILDREN OF PRYCARPATTYA

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Abstract:

The research is devoted to the study of age dynamics components of somatic health in adolescents of different somatotypes. It is found out that both boys and girls during the studied age period have insufficient functional reserve coronary blood flow, that is indicated by the low value of the Robinson index. It requires careful dosage of physical activity in adolescents of studied groups. Installed age and somatotypological health trends of adolescents determine characteristics of physical education to achieve health goals. In particular, the inclusion in physical education of adolescents of all studied groups a sets of breathing exercises is conditioned by the lack of respiratory functional reserves The presence of more favorable age growth of major functional body systems of adolescents of ectomorph somatotype is established. The least favorable characteristics of somatic health components are found in endomorphs. It is proved that the phenomenon of pathological process "selfgrowth" without its changing the force of acting factors (living conditions) is showed up after leaving by the individual the "safe health zone". Given phenomenon requires the usage of focused health- forming technologies in adolescent' physical education. It is believed that adolescence is the most critical of all ecosensitive periods, that is conditioned by a sharp change in the interaction of the cerebral cortex and subcortical structures due to a significant increase in activity of the hypothalamic structures and, resulting in mismatching of vegetative functions under the influence of socio-psychological factors. Adequate selection of targeted exercises according to the state of leading body functional systems gives the possibility to reduce the stress of regulatory mechanisms, to enhance adaptive capability of the individual. Found age and somatotypological features of somatic health components of adolescents require differential approaches in normalization of physical exertion (exercise stress)of schoolchildren recreational training.

INTRODUCTION

Present stage of development of society is characterized by increased emotional stress, increasing of overall level of hypokinesia, increasing of information flow and so on. Numerous studies show that the conditions of anthropogenic load lead to more intensive usage and depletion of adaptive body reserves [9, 11]. Due to incomplete morpho-functional development, inadequate regulatory mechanisms and high lability adolescent organism react on the influence of negative factors, that has its results in destabilization of homeostasis.

According to scientific literature, somatotype is a genetic marker that regulates the peculiarities of the body development at different stages of ontogenesis [7, 8, 13]. As a result, searching of periods of significant reduction of compensatory-adaptive reactions and timely introducing of appropriate remedial measures is one of the important tasks that provides the realization of recreational function of physical education in today's schools [6]. Since the level of schoolchildren health of Ukraine, including Prycarpattya, tends to decrease [12], and the adolescence is characterized by a significant stress of regulatory systems [4], it leads to the relevance of the chosen direction of research.

The aim to find out somatotypological peculiarities of the dynamics components of physical health in adolescents of Prykarpattya.

ORGANIZATION AND METHODS

Researches are conducted at the schools of Ivano-Frankivsk region. The study involved 421 student, including 213 girls of 12-15 years and 208 boys of 13-16 years old. Somatotypological features of the body structure was determined by the method of Heath and Carter [14]. The assessment of somatic health was carried out by the method of G. Apanasenko [3]. The results were processed statistically using Fisher's test.

RESULTS

As we know, one of the important components of somatic health that characterizes the performance of physical education of schoolchildren is conformity of weight to body length. Our study showed that the number of girls who had a threat of obesity ranged from 2,1% to 8,5%. The percent of children with obesity in this age group was 8,3-16,5%. The number of boys that were threaten of obesity ranged from 4,6% to 8,6%. The percent of teens with obesity in a given age group was 11,4-21,1%.

It is found that the most important health criterion is the state of the functional reserves of the cardiorespiratory system. In particular, the double product (Robinson index) reflects myocardial oxygen consumption. The analysis of somatotypological features of adolescent females showed only a 15-years-old ectomorphes had its Robinson index (RI) level below average, that was significantly higher than that of the representatives of mesomorphic type (table 1). Girls endomorphs of 14 and 15 years had significantly higher values of RI in comparison to RI of 12 and 13 years old girls, but still that value was at the low level.

The 13-years old male ectomorphes RI level was below average (table 2). RI values were significantly lower in the group of 13-years old endomorphs than among schoolchildren of other groups ($P < 0.05$).

Life Index (LI) that characterized reserves of the respiratory system, was low among girls of endomorfic somatotype. The level of LI value of 12-14 years old mesomorphes was below average, and in 15 years old group it was low. The reduction of respiratory functional reserves was observed among girls -ectomorphes from the average in 12-13 years old group to below average in 14 years old and low in 15 years old group.

Significantly higher values of LI that corresponded to average level were found among 13 years-old male ectomorphes while the level of mesomorphes was below average and the level of endomorphes was low. The average level of functional reserves of the respiratory system was observed among ectomorphes during all adolescence period and was significantly higher compared with indicators of mesomorphes and endomorphes, that were at a low level except 13 years old mesomorphes.

The positive age dynamic power index (PI) was found only among girls ectomorphes, whose indicators increased from average level in 12-14 years to above average in 15 years. Among the girls of mesomorphic somatotype the PI level reduced from average in 12 years to low in 13 years. In 14-15 years, the PI values of given somatotypological group were at the

level below average. Low PI values were found among 12-13 years old girls of endomorfical somatotype. In 14 years the PI value in the group of females endomorphes were at average level, in 15 years it was below average.

Analysis of somatotypological features of boys increase muscle strength showed the presence of a positive age dynamics. The lowest PI values had teenagers of endomorfic somatotype, that in 13-15 years were at below average level, and in 16 years achieved average level. 13-15 years old mesomorphes had average level of PI, 16 years old had above average level. Among ectomorphes PI level increased from average in 13 years to above average in 14-15 years and high in 16 years.

The efficiency of girls of all somatotypes, according to the results of Ruffier tests, was at high level in 12 and 13 years. Among endomorphs and ectomorphes there was marked its reducing to above average level in 14 years and its further increasing to higher level in 15 years. However, Ruffier index among the 14-years old girls of mesomorphic somatotype was at average level, and among 15 years old it was below average.

Somatotypological pecularities in the dynamics of a given indicator weren't identified among school males of 13 years. However, in all somatotypological groups the boys efficiency was decreased in 14 years, and later was increased in groups of mesomorphes and endomorphes. Only ectomorphes has its Ruffier index decreasing up to 15 years, and in 16 years it reached above average level, which was significantly lower than mesomorphes' one.

Thus, the level of somatic health among girls of mesomorphic somatotype was average during the studied age period. However, its decreasing was marked in 14 and 15 years compared to 12-years old mesomorphes. Its level was above average among 15-years-old girls ectomorphes, while among girls mesomorphes it was significantly lower. Also it was below average among 12-years-old endomorphes. However, comparing to the values of girls of ektomorfic and mesomorphic somatotypes its values were significantly lower in 12 and 13 years. Among 14 years-old endomorphs there was marked the decrease of the somatic health level to below average and its increasing to average in 15 years. The SH level was significantly lower among 14- and 15-years-old girls of endomorfical somatotype in comparison with its level among ectomorphes.

The SH level among boys both ectomorfic and mesomorphic somatotypes was average during adolescence period. The 13-years old endomorphes had its SH level below average in 13, 15 and '16 years and in 14 years it was low.

Thus, the obtained somatotypological age trends of adolescents' SH determine the pecularities of physical education to achieve definite health goals.

In particular, insufficient level of respiratory functional reserves requires the inclusion of certain breathing exercise complexes in physical education of adolescents of all studied groups. As you know, low RI level indicates limited functional reserves of coronary blood flow that requires careful dosing of exercise in all somatotypological groups. In general, favorable age dynamics of SH level was showed among girls and boys of ectomorphic and mesomorphic somatotypes. Schoolchildren of endomorphic somatotype had SH level "below the safe". It is known that [3], when the individual leaves health "safe zone" the phenomenon of "selfdevelopment" of pathological process is displaying without its changing the force acting factors (living conditions).

Table 1. Somatotypological peculiarities of somatic health components of female adolescents

Age	Somatic type								
	Mesomorph			Ectomorph			Endomorph		
	M	**m**	**n**	**M**	**m**	**n**	**M**	**m**	**n**
Robinson index									
12	102,3	4,8	21	99,8	4,6	23	113,2	7,6	12
13	100,9	4,5	19	105,0	7,3	13	●119,2	6,4	12
14	101,9	4,6	18	99,0	4,5	10	#*98,8	2,8	22
15	104,9	3,6	26	●89,3	2,5	12	#*96,8	3,3	25
Life Index									
12	48,5	1,7	21	●56,6	1,9	23	♦●39,6	1,8	12
13	49,8	1,6	19	51,6	1,3	13	♦●44,3	2,6	12
14	47,0	2,4	18	*50,4	1,6	10	♦43,2	1,4	22
15	*#43,3	1,5	26	#*45,1	2,5	12	41,1	1,7	25
Power index									
12	46,9	1,4	21	48,1	2,6	23	♦●35,7	2,3	12
13	*40,4	1,8	19	●47,5	2,1	13	♦38,9	1,8	12
14	43,7	1,7	18	50,4	1,5	10	46,8	7,0	22
15	44,3	1,3	26	●51,2	3,7	12	♦40,7	1,5	25
Ruffier index									
12	2,8	0,7	21	2,8	0,7	23	2,6	0,6	12
13	1,0	0,3	19	2,3	0,7	13	2,2	0,9	12
14	#5,7	1,3	18	3,7	0,9	10	3,5	0,9	22
15	#5,0	1,1	26	§●1,1	0,4	12	2,7	1,0	25
Somatic healh level									
12	8,6	0,9	21	9,5	0,6	23	♦●5,1	0,8	12
13	9,0	0,5	19	9,4	0,8	13	♦●5,5	0,9	12
14	#*5,8	1,1	18	8,8	0,9	10	♦5,3	0,8	22
15	#*5,8	0,8	26	●10,5	0,5	12	♦6,3	0,7	25

Note 1: ● - significant changes between mesomorph and ectomorph, mesomorph and endomorph are marked; ♦ - significant changes between ectomorph and endomorph are marked; # - significant changes in relation to age groups 13 are marked; § - significant changes in relation to age groups 14 are marked; Δ - significant changes in relation to age groups 15 are marked.

Given phenomenon requires using of goal-directed health forming technologies in the process of physical education. It is believed that adolescence is the most critical of all ecosensitive periods, caused by a sharp change in the interaction of the cerebral cortex and subcortical structures because of a significant increase of the hypothalamic structures activity and, as a result, of autonomic functions mismatching under the influence of socio-psychological factors [1, 2, 4]. Adequate selection of goal-directed exercises based on the state of the body leading functional systems makes it possible to reduce the stress of regulatory mechanisms, enhance adaptive capacity of the individual [5, 10].

Received results allow to develop differentiated approaches in the normalization of exercises for fitness training of adolescents according to somatotypological features of the organism.

Table 2. Somatotypological peculiarities of somatic health components of male adolescents

Age	Somatic type								
	Mesomorph			Ectomorph			Endomorph		
	M	**m**	**n**	**M**	**m**	**n**	**M**	**m**	**n**
Robinson index									
13	96,3	4,8	27	89,9	4,9	12	♦●117,1	6,2	14
14	102,6	4,2	31	95,8	5,9	16	♦121,5	12,3	6
15	103,2	3,5	33	98,1	4,2	19	102,7	5,5	6
16	99,2	3,4	28	95,6	5,7	11	104,3	9,3	6
Life Index									
13	53,3	1,6	27	●58,2	1,3	12	♦●42,6	2,2	14
14	#48,4	4,2	31	●61,4	2,6	16	♦42,1	1,9	6
15	#46,0	1,3	33	●56,2	1,3	19	♦40,7	3,4	6
16	49,3	1,4	28	●57,1	2,3	11	Δ♦49,5	2,4	6
Power index									
13	54,0	1,4	27	57,4	1,8	12	♦●45,8	2,7	14
14	#58,6	1,6	31	60,9	2,3	16	♦●45,6	1,7	6
15	#59,1	1,7	33	63,3	2,0	19	♦●49,8	2,3	6
16	#62,4	1,3	28	§#66,0	1,8	11	§#♦●56,3	3,1	6
Ruffier index									
13	1,9	0,6	27	2,5	0,9	12	2,7	1,0	14
14	#5,1	0,9	31	5,4	1,2	16	6,7	2,2	6
15	§3,1	3,1	33	6,8	2,4	19	5,1	2,0	6
16	§2,0	0,5	28	●4,5	1,2	11	1,8	1,9	6
Somatic healh level									
13	9,5	0,6	27	10,3	0,9	12	♦●3,2	1,1	14
14	#6,8	0,9	31	8,2	1,0	16	♦●1,3	1,5	6
15	7,8	0,6	33	8,1	1,0	19	♦●2,6	1,9	6
16	§9,6	0,5	28	10,1	1,1	11	♦●5,4	1,7	6

Note 2: ● - significant changes between mesomorph and ectomorph, mesomorph and endomorph are marked; ♦ - significant changes between ectomorph and endomorph are marked; # - significant changes in relation to age groups 13 are marked; § - significant changes in relation to age groups 14 are marked; Δ - significant changes in relation to age groups 15 are marked.

CONCLUSIONS

Low Robinson index, that shows the reserves of coronary blood flow, is observed among adolescents of studied somatotypes, and requires careful approach in physical activity dosing.

Insufficient respiratory functional reserves of adolescents need the using of adequate means directed to their development.

The presence of more favorable age development of major functional systems of adolescents of ectomorphic somatotype is observed.

The least favorable features of the somatic health components are found in the group of endomorphes.

Identified somatotypological pecularities of somatic health components of adolescents requires a differentiated approach in observing the intensity of physical exercises.

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