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Short Communication

Administrative and Adaptive Status Modern Schoolchildren

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Abstract

The paper describes the characteristics of the resulting effector functional status of students differentiated by administrative-territorial and gender. The study found that rural children, compared to their urban peers, generally showed no significant deviations from regional physical development standards. However, rural children tend to have lower height and weight with increased chest circumference and lung capacity. They also have higher blood pressure but maintain an optimal heart rate and display more stable cardiovascular reactivity.

More Information

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Physiological adaptation is a set of physiological reactions underlying the body's adaptation to changing environmental conditions and aimed at maintaining the relative constancy of its internal environment – homeostasis [1].

The search for hygienic criteria for evaluating the effectiveness of educational technologies from the point of view of preserving children's health during school education shows the high informative value of indicators of children's physical development.

Secondary school students of the Nizhny Novgorod region took part in the observation; schoolchildren of grades 1-3 (n = 1300), a representative group of peers of Gorody Arzamas acted as a control group. The study of modern children was conducted in the dynamics of the 2022/23 academic year. The main parameters of morphological functional adaptation of children were observed, as well as functional reactivity of the cardiovascular system, and vegetative provision of physiological processes.

The distribution of the observed groups of rural and urban schoolchildren by health groups showed that when entering the first grade, the first group of health was absent (both in the first and third grades), both urban and rural children. The second group of health in rural schoolchildren is 66%, in urban 44%; the third group of health in rural 36%, in urban 54%. The fourth group of health is missing. Further, the second group of health in rural 61%, urban 75%, and the third group of health in rural 41%, urban 17%. The fourth group of health is absent in rural areas, and 7% in urban areas. Objectively, rural children are healthier, both when entering the first grade and by the end of primary education.

A comprehensive assessment of body weight, as the main factor of physical maturity of schoolchildren, in the dynamics from 7 to 11 years old, showed a difference in the weight characteristics of younger schoolchildren. Urban students do not experience a mass deficit, unlike rural children. The body weight of urban schoolchildren corresponds to the average optimum - the fourth centile interval (4c). And the body weight of rural schoolchildren corresponds to both (3ts.i) and (2ts.i). A comprehensive assessment of body length showed a difference in the height characteristics of younger schoolchildren. The average growth value of urban schoolchildren corresponds to (5c.i), and rural schoolchildren (3c.i).

Statistical analysis of the functional characteristics (CCC) of children in the gradation of factors of "gender" and the urban-rural environment showed that rural girls, on average, statistically significantly differ from urban girls in the direction of functional tension (CCC) at ($p < 0.05$). This is confirmed by higher indicators of both systolic and diastolic Blood Pressure (BP). In boys, there is a significant difference at ($p < 0.05$), in the indicator – diastolic blood pressure, systolic

blood pressure differs at the trend level ($p < 0.05$); (Table 1). A comparative analysis of the studied indicators within rural and urban groups in the gradation of the "gender" factor showed no significant difference. Hence, it can be assumed that within the environment, groups of children, regardless of gender, are homogeneous, according to the fundamental indicators of hemodynamics, whereas rural and urban groups are significantly heterogeneous (Table 1).

Physical activity tests allow you to determine the physical working capacity of the body. In our study, we used a screening, submaximal test "squat test"[2]. The percentage of increase in the frequency of muscle contractions after exercise in rural children is lower, unlike in urban children. Presumably, the functional reactivity of the cardiovascular system of primary school children is more stable in rural children than in urban children (Table 2).

Table 1: Statistical analysis of the functional characteristics (CCC) of children in the gradation of factors of "age and gender" and the urban-rural environment.

Blood pressure	Gender	City	Village	Ts =	$p <$
Systolic	♀	91.4 ± 0.75	94.1 ± 0.45	3.15	0.05
	♂	92.1 ± 0.63	92.7 ± 0.54	0.72	0.47
Statistical difference		$t = 0.75$ $p < 0.47$	$t = 0.92$ $p < 0.50$		
Diastolic	♀	58.6 ± 0.92	62.1 ± 0.28	3.64	0.05
	♂	58.2 ± 0.77	62.3 ± 0.35	4.46	0.05
Statistical difference		$t = 0.33$ $p < 0.74$	$t = 0.67$ $p < 0.51$		

Note: Statistical analysis was performed using the student's t-test with significance at ($p < 0.05$).

Table 2: Dynamics of functional reactivity of the cardiovascular system of primary school students "City" "Village" (%).

Reactivity/Score	Unsatisfactory/2	Satisfactory/3	Good/4	Excellent/5
City	17	46	30	7
Village	1	10	87	2
Statistics	$X^2 = 57.01$; cc = 3; $p = 0.01$			

An analysis of the tension of the autonomic nervous system by the secondary coefficient - the Kerdo index [3], for primary school students, showed that rural children, unlike urban children, have a more pronounced and constant sympathetic tone, within the average value of 0.3 cu, with minimal variation, whereas urban children throughout the study showed a more extensive the spread of the indicator. Urban children at the beginning of their studies show a state of hypertension, by the end of the year the tone acquires a sympathetic character, the entire second grade is maintained at the level, and in the third it normalizes again with the manifestation of some vagotonic excitement. Rural children have a stable moderate sympathetic tone for three years of education, and urban children tend to have vegetative lability.

Conclusion

Thus, the analysis of the main parameters of morphological functional adaptation of rural and urban children of primary school age showed that in the total mass, there are no significant differences from the modern regional standard of physical development of children and adolescents. However, rural children differ in the level of trends from their urban peers in lower height and low weight, with an increased chest circumference and increased lung capacity. Rural children have higher blood pressure. At the same time, their heart rate is in a more optimal range. In rural children, the functional reactivity of the cardiovascular system is more stable, while maintaining the tendency of moderate sympathetic tone.

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