

МЕДИЦИНСКИЕ НАУКИ

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**CHILD HEALTH MIXED ASSESSMENT UNDER THE REGIONAL CONDITION OF
TYUMEN SOUTH AREA AND TYUMEN EXTREME NORTH AREA.**

summary

In the current context child sickness rate is increasing. The most vulnerable group is migrant children brought to Tyumen extreme North while going through regional adaptation. The author demonstrates the results of comparative evaluation of child health based on mixed examination of physical development data and blood circulatory and respiratory systems data coming down with children and teenagers living under micro-social and macro-social conditions of Tyumen South area and Tyumen extreme North area. Regarding that regional adaptation is bound up with health characteristics it is recognized that donozological diagnostics, as a primary tool for structural and functional damage control, makes possible disease forecasting and prevention following with child health correction.

key words:

children and teenagers; migrant Northmen; physical development; functional condition;
donozological diagnostics; health assessment.

The lack of coordinated work between health care agencies and educational institutions, the lack of expertise in physiology and medicine, pedagogics and psychology, all intended to educate population and promote a healthy life style, result in the situation when child sickness rate continues to grow despite all the medical effort. Meanwhile among the most vulnerable appear migrant children when they adapt to the extreme climate and environmental conditions of the Far North, children challenged in their physical development and adaptation abilities, and having control problems with their vital mechanisms for the body regulation. Under these circumstances donozological control over basic health indicators for young children is viewed critical in indentifying risk groups and forecasting development problems.

The main objective of the research is to give mixed donozological diagnostics of physical development, main body systems, performance and adaptation capability being integral health indicators of a body. The examination was held in children's educational institutions in the South (the city of Tyumen) and the Far North (Salekhard) as well as in the country areas of Tyumen region. We examined children aged 7-9 and teenagers aged 13-14.

Methods of research. The following methods of research were used:

- 1 – evaluation of the physical development and functional condition as principal criteria for health assessment applying unified anthropometric techniques and regression data analysis according to Martin's method (sigma deviations);
- 2 – evaluation of functional competence according to age development and homeostatic condition – blood circulation and respiratory systems with computer-aided data recording;
- 3 – evaluation of performance capability and aerobic performance under a standard load testing (PWC170 test);

- 4 – evaluation of mechanisms regulating basic functions according to the activity rate of sympathetic and parasympathetic parts of the autonomic nervous system;
- 5 – heart rate analysis (“Pulsar” supplied with special classifier) to identify adaption capacity of a cardio-vascular system being the principal indicator of a body condition;
- 6 – experimental detection of an individual type of hemispheric asymmetry (Leutin V. P.) being one of the indicators for a complete adaptation process.

These methods provide full information and do not cause damage, they correspond to the age level of individual development and comply with the international ethic standards of child examination thus making it possible to apply them in children’s educational institutions.

Results of the research and the discussion. The comparative data analysis of 9-year-olds living in the city and in the country shows the decline in individual growth rate, annual weight and height gain, and chest circumference as compared to the previous data [4]. Table 1 demonstrates basic indicators of physical development (total body measurements) for urban and rural schoolchildren aged 9 in the South of Tyumen region.

Table 1.

Indicators of physical development for
urban and rural schoolchildren aged 9 (M ± m, σ)

Note: the numbers of the groups compared are given in brackets; M – boys, F - girls.

No	1	2	3	4
Group	rural		urban	
Sex	M	F	M	F
Number	30		30	
Body length, cm	128.6 ± 1.0 5.2	128.3 ± 1.0 5.4	130.1 ± 0.4 2.2	131.1 ± 0.4 2.2
*				*(2, 4)
Body weight, kg	26.6 ± 0.7 3.6	26.5 ± 0.8 4.3	27.5 ± 0.3 1.6	28.1 ± 0.4 2.2
Chest, cm	65.4 ± 0.7 3.8	64.9 ± 0.8 4.2	62.4 ± 0.3 1.6	62.2 ± 0.4 2.2
*	***(1, 3)	** (2, 4)		
BMI	1.09 ± 0.04 0.21	1.08 ± 0.02 0.11	1.11 ± 0.04 0.22	1.11 ± 0.05 0.27

The body build of urban and rural schoolchildren living in the South of the region is characterized by mesomorphic proportions toward mild dolichomorpha, which is proved by the BMI (Body Mass Index) dynamics. The BMI shows that urban children grow much faster than rural children, particularly girls.

80% of both boys and girls living in the country gave eutonic reaction to the standard physical load with 10% of boys and 13.2% of girls giving negative hypotonic reaction, and a few – hypertonic. As for the children demonstrating eutonic reaction, it took 6% of them 7 minutes to restore their arterial blood pressure and heart rate back to normal, which is also viewed as negative. The number of the urban children demonstrating eutonic reaction was less than that of the rural children, namely 66.9% and 73.4% between boys and girls correspondingly.

Body build evaluation of children living either in the South (middle latitudes) or the Far North (high latitudes) against Pignet Index showed decline in body strength and solidity as well as arrested physical development and functional maturation. Thus it was discovered that North migrant teenagers suffered growth and development problems during the critical stage of development, such as decrease in growth spurt amplitude (boys) and absence of growth spurt (girls), decelerated second biological growth decussations, particularly in chest circumference. As compared to the previous data [2; 5; 8]

this indicator used to be higher for North residents than for their counterparts living at middle latitudes. Decrease in chest circumference affects the vital lungs volume and breathing. The maximum amplitude of growth spurt, characteristic for the teen age, has also declined, being 6.2 cm for boys and 4 cm for girls. A survey into the female teenage of regular menarche showed average delay of 1 - 1.5 years.

Evaluation of morphofunctional condition of 7-year-old children going through adaptation to study in the Far North showed that the adaptation process was accompanied by decrease in the number of children with normal physical development, and their worse functional condition than their counterparts who started school in the South. The received data evaluation proved a significant lag of 7-year-old children, having migrated to the Far North in the early childhood with their parents, from their South counterparts in the basic anthropometric parameter – body length ($p < 0.01$). Meanwhile these 7-year-old North residents did not differ from the check group in the body weight – current condition indicator, but had narrower chests. Significant differences from the check group of the same age were found after analyzing sigma intervals of North children's anthropometric properties. The average numbers for children in Salekhard were higher than the check figures (Tyumen). "Below average" stature appeared characteristic for equal number of Salekhard and Tyumen children but the percentage toward "above average" and "tall" stature appeared higher for Tyumen. The number of overweight children in the Far North has grown and that can be explained by lower metabolic rate due to thyroid malfunction [7].

The North children's harsh development can be caused by unhealthy, dreary diet when age development demands and metabolic features in the cold climate are not taken into account. It has always been true that North residents need specially designed diets, individual modes of work and leisure, and natural antioxidant food. But still most North residents suffer lack of vitamins, and the major nutrients balance is far from being optimum. It is well-known that in the animal world the most adapted to the environment are those animals that have average features and properties. It is the same with the humans – children having average anthropometric parameters show the least health abnormalities. The evolving morphofunctional type of North children is characterized by lower extreme changes, if any, and this must be a specific way of body reaction to severe climate conditions of the region.

Along with cardio-vascular deregulation after a standard load (PWC₁₇₀ test) North teenagers had more frequent hyperventilation, tachyrrhythmia, lower integral cardio-respiratory parameters – physical performance and maximum oxygen consumption, calculated per 1 kg of body weight, that being more characteristic for female teenagers (Table 2).

Table 2.

Integral cardio-respiratory parameters for North teenagers ($M \pm m$)

Age, years	Sex	PWC ₁₇₀ , kgm/m/kg	VO ₂ max, ml/m/kg
13 n - 225	m	16.1 ± 0.5 *** ⁰	47.4 ± 1.3 *
	f	10.4 ± 0.3 ⁰	44.3 ± 1.1
14 n - 238	m	18.4 ± 0.6 ***	53.8 ± 1.6 *** ⁰⁰⁰
	f	12.4 ± 0.4	46.8 ± 1.6

Note: * - sex difference; ⁰ – age difference; m – boys; f – girls

Adaptation gathers "physiological toll" and results in increasing sickness rate.

The data obtained prove that extreme environmental factors can badly affect children's body development. It is obvious that teenage is a key period of the development and it is vulnerable in face of external impact. As soon as North children's development is accompanied by adaptation and

simultaneous inner neurohumoral modulation under puberty, excessive pressure (including school) on children leads to morphofunctional abnormalities and health problems.

New data obtained by the research show that physical development level and adaptation ability of teenagers are related to their individual type of functional hemispheric asymmetry (FHA). It was found that North teenagers have more frequent left side features in their lateral phenotype, which can be explained by better adaptation ability of children with dominant sinistral features in their FHA type, as proved by authoritative writers [1; 6].

The functional change index calculated according to Baevsky R. M. and Berseneva A. P. (1997) and modified for children by Antropova M. V. (2002) showed that migrant teenagers had the worst adaptation ability if they had dominant right side features, so it again proves the assumption that children with dominant sinistral features in their lateral phenotype have better adaptation ability (Table 3).

Autonomic regulating mechanisms play a leading role in adaptation to the environment.

Table 3.

Physical development parameters and functional change index (FCI) for North migrant teenagers ($M \pm m$)

groups	Asymmetry type	Body length, cm	Body weight, kg	Load (left hand)	FCI, Points
M n - 72	right	159.0 ± 1.4	48.5 ± 2.0	19.7 ± 1.5	1.87 ± 0.01***
	left	170.7 ± 3.4 **	61.5 ± 3.5 *	30.1 ± 3.0 *	1.61 ± 0.02
F n - 78	right	161.6 ± 1.5	52.3 ± 1.4	11.8 ± 1.7	1.72 ± 0.08 *
	left	160.0 ± 3.0	52.6 ± 3.2	13.7 ± 2.8	1.60 ± 0.07

The method of variation pulsometry allowed evaluating autonomic homeostasis of children who began school. When we analyzed and classified first-graders' cardiorythmogrammes with different percentage of sympathetic and parasympathetic nervous systems, we found that the number of children with parasympathetic regulation had increased (from 12% to 37%) within the first year. It appeared that boys had more frequent decrease in heart rate stabilization with dominant parasympathetic deregulation. It is known [3; 4] that adults' blood circulation system can react in different ways when the system undergoes functional modification or abnormal change. Children's systems usually demonstrate deregulation when their spare capacity declines, they are under excessive pressure and asthenization, and this corresponds to the above mentioned data.

CONCLUSION

To sum up, it should be noted that the research showed significant age and growth changes, arrested physical development, lower spare capacity of the child's body under severe environmental conditions in a large industrial region. A mixed approach to studying children's morphofunctional adaptation in the circumstances of intensive migration, under excessive physical and intellectual pressures seems promising when individual age characteristics including lateral phenotype are taken into account, as soon as adaptation is closely related to health. A new technique of [donozological diagnostics](#) has been developed. It is based on methodological principles and assessment methods applied to physical development and vital systems after screening. It is viewed as a primary tool for structural and functional damage control, makes possible disease forecasting and prevention following with child health correction.

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ДИСФУНКЦИЯ ВИСОЧНО-НИЖНЕЧЕЛЮСТНОГО СУСТАВА И ЕГО ЛЕЧЕНИЕ

Аннотация

На возникновение и развитие патологии височно-нижнечелюстного сустава оказывают влияние самые разнообразные факторы. Это и психоэмоциональное состояние пациентов, и травмы челюстно-лицевой области, и дефекты зубных рядов, в результате которых нарушается функция жевания, наличие пломб и зубных протезов в полости рта, патологическая стираемость твердых тканей зубов, вредные привычки. Боль является одним из симптомов