

Analysis of morphofunctional changability of adolsest students in the environment of Ural Federal District

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Abstract. The aim of the research was to study common factors of individual and typological changeability of morphofunctional parameters of students' organism in Ural Federal District environment in dependence to the place of residence, age and gender and physical activity in juvenile period. The carried out comparative estimate of organism intergroup variability let us find out e regional norm of morphofunctional indexes. It is discovered that morphosis of young men and women corresponds general biological common factors, however, dissimilar environmental conditions influence the structural and functional range of students' of Ural Federal District, that is why, age and gender, climate and geographic, social and economical. Conditions are a modifying factor of phenotypic variation of the organism of Ural Federal District students. At the stage of modern development of Ural Federal District, peculiarities, observed by us in morphological and functional condition of students' organism let us purposely develop programs , directed on health improvement and somatic growth strengthening of the younger generation.

[Dragic O.A.,Sidorova C.A.,Sidorova T.A., Ivakina E.A., Zobnina S.V. **Analysis of morphofunctional changability of adolsest students in the environment of Ural Federal District.** *Life Sci J* 2014;11(11s):595-598] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 135

Keywords: health, morphofunctional form, ecological situation, physical fitness indices, antropometric parameters, cardiovascular system, cardiorespiratory system, motion activity.

Introduction

Nowadays decline of ecological, psychological living conditions in our country has especially strong influence on health status of the younger generation, who are an objective indices of the environmental condition [1, 2].

It is generally agreed, that the leading health criteria are physical fitness and adaptive capabilities of the organism, however, a consistent approach to their estimate, still doesn't exist [3-8]. Problems of low level of physical and social development of population should be considered in complex, with taking into account long-standing programs of economical and social country development. Health is a complex of physical, psychic, social and moral but not only disease or physical defects clearance. From ecological point of view, such understanding of health, in particular, reflects presence of complete balance, adjustment of the organism to the environmental conditions [9].

Three cities with different ecological environment were explored. They are:

Perm, a heavy industry metropolis, machine building first of all; Chelyabinsk, an important industrial center of Russia, core industries are iron and steel industry, machine building, coal mining near Chelyabinsk; Tyumen is a large economical and cultural center. Important branches are: machine building, metal and woodworking. Estimating ecological situation of the region we took

into account: air quality, soil and water objects contamination by human-made toxic agents and nuclear pollution of ground-level air pollution, soils and water. Water objects contamination is extremely high in three regions, but, in general, the ecological situation in Chelyabinsk and the Perm Regions is significantly harder in air pollution and water contamination by human-made toxic agents and radionuclides, than in Tyumen Region [10, 11].

The division of students on urban and rural place of previous residence is worth mentioning, that are the places, where their organisms developed and formed, differences between life style, type of nutrition, day regimen, motion activity level before entering the Institution of Higher Education, than after entering the university, there happen changes of habitual life-style, day regime, nutrition, homeliness, psychological stress in examination period, plus specific character of education in agricultural university and, of course, a changeover from school to Institution of Higher Education also influence significantly.

Urban environment makes individual changeability processes sharper, that appear with significant modality in morphofunctional indices of young men' and young woman' organisms, cause in urban area a population number is much higher, than in separately taken village; high population migration is noticed in cities, that lacks in rural area; in cities, in case of marriage, the choice is great, that causes

marriage mixture, the choice is limited in rural area and in the city all this leads to heterogeneity phenomenon, the increase of gene number, genofond expansion, that is why urban environment causes the strengthening of individual changeability processes, that appears in significant variability [12].

An actuality of the question discussed, and lack of information, concerning forming and development of youth organism against the background of the most important for Russia's economy region are stimuli in present labor writing.

Methodology. Complex research of morphofunctional organism status of girls and young men in the age of 17-20 years old was made. Altogether, 1500 students, studying in agricultural universities of Tyumen, Chelyabinsk and Perm, were explored. The objects of exploration were divided according to the place of their study (Tyumen - Chelyabinsk – Perm), the place of previous residence (city – village), sexual character (young men – girls), and a group with high motion activity level was selected.

The research was carried out with the help of the following methods: anthropometric measuring, functional tests and functional trials fulfillment. According to anthropometric data mass and weight ratios, body weight proportion, somatotype and constitutional type were computed. Functional status of the organism of the examined students was defined by: cardiorespiratory system, muscle strength, hemodynamic parameters, vegetation index Kerdo and adaptive potential examination. The range of functional reserves of students' organism and their working capability was identified on the basis of graduated exercises: Marthine-Kushelevsky probe, Ruthe probe, calculation of Ruthe-Dixon probe, step-test PWC₁₇₀. Mathematical treatment of results was fulfilled.

General Part.

In the course of physical development of young people complex estimating, anthropometric indices were taken into account, which are more constant and reflect age regularities in the development of the organism. A range of somatic peculiarities was identified. It is dedicated, that indices of physical development of examined students depend on natural and climatic, ecological, social and economical factors that is proved by many scientists' researches [13]. Body structure of students from the city, according to body length and weight sizes are estimated by the highest values, in the same time, higher chest perimeter and shoulder width values have their rural age mates, that means that in rural area conditions we may see a decrease of longitudinal and an increase in cross dimensions of

body sizes, that is explained by the influence of various conditions of organism's development and forming.

Mention, that growth and development of morphometric indices of students of Ural Federal District corresponds general biological laws, however, on comparing length and body weight indices of students from different parts of Ural Federal District it is deduced, that Chelyabinsk inhabitants of both sexes notices a tendency to the increase, in the same time the analysis of chest and shoulder breadth a tendency to decrease is deduced, that means an increase of longitudinal and a decrease of cross dimensions of body, that is explained by the organism reaction on unfavorable ecological situation in the region. Physical exercises support the tendency of the parameter increase, we consider. Obtained materials are an evidence of harmonious development of the organism and correspond the essentials of energetic rule of skeletal muscles of I.A. Arshavsky (1982), physiological sense of which is that motion activity of an alive system is the factor of hypernormal anabolism induction.

A comparative estimate of individual and typological, intergroup changeability of the organism of youth-age students, we made afford us to state regional norm of morphological indices in dependence of the place of residence, place of education getting, age and gender identity, level of motion activity, and, also individual and typological, intergroup and sexual differences that let us in a more objective manner characterize somatic type forming.

In contrast with morphological character, characterizing body structural changes in the process of children growth, physiological indices mostly reflect dynamics of functional capabilities of the organism development [14]. Functional state of an organism is distinguished by separate physiological system activity [15]. The environment influences greatly on changes in functional state of an organism, that is especially noticeable in growth and development of the rising generation [16].

Physic development of a human is tight fully connected with functional state of the organism, which is one more constituent of health. Complex of morphological and functional indices, their meaning, should be considered from the point of one of biological principles, the entity of structure and function. Physiometric indices determine level of functional stability and reflect individual changeability of an organism. It is discovered that physiometric indices of examined students have intergroup and regional differences: level of functional indices of cardio vascular system is determined by age and gender peculiarities and a complex of environmental factors. Rural young men

and girls have high frequency rate of heart beat, systolic and diastolic blood pressure, that, in our opinion is the reaction of an organism on the change of life conditions.

On comparison of given indices of students from different area of Ural Federal District was noticed, that Perm students of both sexes have the lowest indices of HR and the highest arterial tension, that means, that one indices are compensated by optimization of the others. Under the influence of sport trainings sets a high functioning range of vital systems of students' organisms. Obtained results of research of cardio vascular system stated, that all indices we studied, stay within norm spectrum or are in frames of optimal functionality of cardio vascular system.

Obtained results of research of respiratory system showed heterochrony of indices development. Chelyabinsk young men and girls have tension in respiratory system indices, that are explained by unfavorable climate and ecological conditions of the region. Individual and typological changeability, which is determined by morphological characters, finds its proof in physiological researches of cardio vascular and respiratory systems.

Results of the test complicated showed that the higher tolerance to physical exercises on the organism have students from rural areas, that influences adaptive reserves and high persistence of organism on the influence of unfavorable factors of the environment. We noticed a changeability of vegetative regulation of the organism of students, living in conditions of city and village. Prevailing of sympathetic influence has rural inhabitants and parasympathic influence of vegetative nervous system have city inhabitants, which are the course of environmental influence on students' organism.

Conclusions.

Analyzing obtained results, we stated, that age and gender, climate and geographic, social and economical conditions are a modifying factor of phenotype changeability of students' organism of Ural federal District. However, was noticed, that development of young men' and girls' organisms corresponds general biological laws, but different environmental conditions influence the range of structural and functional changeability of students' organisms from Ural Federal District. Anthropogenic factors of environment unfavorably influence at physical development indices, homeostasis processes regulation and decrease individual health level. Urban environment makes processes of individual changeability stronger, appearing in significant variability in morphofunctional organism indices of young men and girls in Ural Federal District. On

adaptation to increased motion activity, morphofunctional ratios, raising persistence to unfavorable environmental factors influence, are forming.

This way, the process of age development of cardio vascular system is characterized by heterochrony in ratio progress in the period of 17-20 years and is determined by a whole complex of intergroup and regional differences. Cardio vascular system reacts actively on extreme factors' influence. It is highly reactive as it is functionally connected to nervous and endocrine systems and is one of the first, which comes into adjustment reaction to keep an optimal level of oxygen provision. On its functional state mostly depends the success of human adaptation to climate and social conditions. Cardio vascular system activity provides homeostasis of the organism and keeps high workability in an inadequate environment.

Being based on modern representations on the growth and development of an organism, general and particular correlation, biological and social in individual development, genetically conditioned and being under control of environmental factors, we dedicated morphophysiological peculiarities of students of Ural Federal District. Obtained data let us more wisely and effectually use different arrangements for harmony of physical development obtaining and health strengthening. Results of the labour stated the level of physical development and functional indices detected, may serve as criteria of young men' and girls' estimation in the age of 17-20 years old, who live in Ural Federal district.

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7/16/2014