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Analysis of Features of Adaptive Reactions of Students in Urban Environment

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***Abstract*—The aim of the study was to examine the features of adaptive reactions of the female organism under the influence of the urban environment during their study at the University. On the basis of a comprehensive study of psychophysiological indicators of urban and rural girls, for the first time psychofunctional differences among students of all study groups were established. In comparing the functional indicators of rural and urban girls, the following priority data were obtained: rural girls showed higher values of the functional state of both the cardiovascular and respiratory systems, as well as muscle development than the urban girls did. The consequence of differences in functional measurements is a level of body's adaptation possibility. The obtained data of the functional and psychological status of female students studying in higher education institutions, as well as their adaptive capabilities can be applied to develop regional standards, improve the efficiency of the educational process at the University and provide conditions for gentle adaptation of first-year students to new social conditions, also, serve as a basis for planning health preservation measures in the training process at the University.**

Keywords—health; morphofunctional state; ecological situation; indicators of physical development; anthropometric parameters; cardiovascular system; cardiorespiratory system; motor activity

I. INTRODUCTION

The increasing anthropogenic impact on natural complexes requires environmental studies to develop methods for testing the response of living organisms to negative processes observed in ecosystems.

Environmental factors, affecting the functional systems of the whole organism, can cause their qualitative and quantitative changes, which in turn affect the health of the younger generation [3, 6].

The problem of human adaptation to various environmental factors is one of the central problems in biology and medicine. In the process of adaptation, there is a bio-regulation change focused on the restoration and maintenance of homeostasis, as well as maintaining body functions. A necessary element in a variety of adaptive reactions is stress, conducted by means of nonspecific response of the body, reflecting the state of organs and systems' stress functions and mobilizing its reserve capacity.

Factors affecting the state of functional reserves of the central nervous system and the level of body's adaptability are: general health, social environment, climatic and environmental conditions, etc. [2, 4, 9, 13, 21].

In the training process in higher educational institutions, when physiological systems receive considerable stress and are particularly vulnerable towards effects of the environment, inadequate study hours and the impact of social and psychological factors increase [11, 12].

In recent decades, quite hard changes in the Russian system of education have taken place: there appeared new educational institutions of various types, a new level of assessment of the quality of knowledge using a competent approach and a score-rating system. At the same time, the educational load and the share of independent work of students significantly increases, the regime is violated, and as a result the health of children deteriorates[7, 22].

The activity of students in the training process is associated with increased workload on the body, leading to an uneconomical waste of a functional reserve. As a result, the working capacity decreases and fatigue appears [5, 14, 15].

Training at the university is attributed to a change of residence, social environment and the normal rhythm of life. This is the cause of psychophysiological stress and requires efforts to adapt the organism to environmental conditions [9, 17, 19].

In available sources of literature, data on psychophysiological and morphofunctional features of the girls living in different ecological areas (the city, the village) who started training at higher education institution in the conditions of Northern Trans-Urals are not found. However, the study of this problem becomes relevant, because girls at the age of 17-22 have changed place of previous residence and ecological and social environment.

The aim of the study was to examine the features of adaptive reactions of the female organism under the influence of the urban environment during their studying at the University. To achieve the aim, the following tasks were set:

1) to study the features of anthropometric and constitutional indicators during studying at the university, taking into account the place of the former residence;
2) to establish the characteristics of the response of the cardiovascular system of urban and rural girls, depending on the year of study at the university;
3) to reveal the features of vegetative regulation of body's the functions of girls living in different ecological areas;
4) to assess the level of psychophysiological state of girls, depending on the year of study at the university, as well as on the place of their former residence.

II. Material And Methods

To achieve the set aim and the tasks, quite informative and accessible to the mass survey techniques were chosen. The study of morphofunctional and psychophysiological indicators of the state of the organism of rural and urban girls was conducted. 480 female students studying at Tyumen State Agricultural Academy were examined.

The received data on the morphological and functional parameters of the organism were reflected in the protocols of scientific research and a computer data bank. The study of anthropometric, functional and constitutional features of the girl's organism was carried out according to a unified technique and technical execution.

The studies were conducted on the basis of Tyumen State Agricultural Academy, at the Anatomy and Physiology Department. Morphofunctional parameters were measured in the first half of the day, taking into account biorhythmological recommendations. For examination students, who do not have chronic diseases were not sick less than 2 weeks before the assessment and passed the examination of the therapist, were selected. All measurements were taken in medical offices of the institution in a relaxed, familiar to students atmosphere. To determine the degree of conjugacy between the studied parameters, the research processing was carried out by means of correlation and cluster analysis on the computer Pentium-II, using Microsoft Exsel software package for Windows- 2007.

III. Results of The Study and Discussion

The human organism is constantly in interaction with its environment. As a result, the problem of studying the impact of environmental factors, including on the emerging organism, plays an important role in assessing the process of adaptation to new social conditions. The carried out research of rural and urban girls revealed a number of features in the formation of morphological and functional status, which differ depending on the place of former residence. The study of anthropometric indicators of girls determined many somatic peculiarities, which depend on the place of their former residence and the year of their studying at the university. In data analyzing, it was found that the urban girls have higher values of the body weight, length and surface area in comparison to rural girls in all surveyed groups; the indicators of the chest circumference, shoulder width and pelvis are higher among rural women, which appears to be a consequence of lifestyle. With the increase in the year of study, an increase in anthropometric indicators in all groups was noted. The study of subcutaneous fat deposition in the girls' body revealed a uniform distribution of it in all the groups studied, with a predominant fat deposition on the back, abdomen, thigh and shin. The maximum values of skin-fat folds are marked among rural girls in all groups, which, in our opinion, is the result of the nutritional features. The lowest indicators of the average fat fold in our study were noted among first-year girls, that is, with an increase in the year of studying, an increase in the average fat fold is established, regardless of the place of former residence. Therefore, the study of skin-fat folds allows objectively determine the fat content, as well as formative processes in the body of students at the age of 17-22.

It is common knowledge that constitutional types of people reproduce the evolution of a person who lives in one or another climatic and geographical conditions [16, 21]. In our study we used the classification of somatic constitution types by M.V. Chernorutsky [20], which includes asthenic, normosthenic and hypersthenic types of body.

In data analyzing, it was found that Normosthenic was dominating in all the surveyed groups (from 48% to 61%), and the highest rate of this type was found among urban girls of the third year (61%). However, there is a significant difference in distribution of constitutional types according to their former place of residence. It has been found that asthenic type of constitution prevails among urban students, and hypersthenic type – among rural. That appears to be a consequence of lifestyle.

Thus, studies on the assessment of constitutional types significantly complement the identified quantitative characteristics of body weight. All received data are interconnected and characterize the individual body characteristics of girls living in the conditions of the Northern Trans-Urals.

According to the results of our research, it can be concluded that girls are mostly proportionally developed (on average 54%), quiet large number of urban girls (on average 33%) have an elongated and narrow body and only about 10% of urban students have a preferential body development in width with a small moderate growth.

The largest number of rural girls (50% on average) is also proportionally developed, but the elongated and narrow body has a smaller number of students (18% - 1st year students, 12% - 3rd year students and 13% - 5th year students) in comparison with students who have body development mainly in width with a small moderate growth (34%, 38% and 36%, accordingly).

Analyzing the differences in heart rate (HR) and blood pressure (BP), depending on the place of former residence, it was found that in all the studied groups the rural girls showed higher outcomes in contrast to the urban girls. This is explained, in our opinion, by the change of the former place of residence. During the period of training in higher educational institutions, a decrease in heart rate was noticed.

The data obtained allow us to extend the characteristics of the functions of vital systems and determine the level of individual typological variability in the physiometric indicators of the student body. The data obtained confirm intergroup and individual differences, revealed in the study of physical development.

Comparing the indicators of the vital capacity of the lungs of girls depending on the place of their former residence, we determined that the rural students of all groups had significantly higher values.

Thus, the data obtained from the study of cardiovascular and respiratory systems determined heterochronicity in the development of indicators. So the rural girls have a functional tension in the indicators of the cardiovascular system, which is the result of a change of the usual lifestyle. Urban girls have tension in the indicators of the respiratory system, this is explained by the low level of individual health. Individual-typological variability was confirmed in physiological studies of the cardiovascular and respiratory systems.

According to the data, rural girls are more sympathotonic, the urban – vagotonic, but while studying the number of sympathotonics among rural students has reduced.

Researching the muscular system, we found significant differences in the absolute and relative muscle strength of hand and back, where these indicators are higher by rural girls in all studied groups. During the study, a decrease in these indicators was found.

Thus, all students showed significant differences in the muscular strength, depending on the place of former residence and age. The results of the study make it possible to characterize the functional state of the female body and objectively assess the strength and contraction of muscles.

The data obtained from the studies of higher nervous activity showed that 83% of rural girls and 47% of urban girls of the first year of studying have the type of higher nervous activity, characterized by a high degree of stress resistance; as for the 3rd and 5th year students, no differences depending on the place of the former residence were found.

There is clearly observed the following trend – rural girls have the temperament that corresponds better adaptation opportunity. First-year girls living in the rural area have the type of temperament that corresponds better adaptation itself.

In addition to identifying the prevailing type of temperament, the psychological structure of the temperament was investigated (according to Smirnov's questionnaire). The polar properties of temperament were determined: extraversion - introversion, emotional excitability, emotional balance, response rate (fast - slow), activity (high - low).

Our research showed that a number of extroverted persons are two times greater than the number of introverted ones in all groups both among rural and urban girls. The study revealed that the first and the third year students show high emotional excitability index. In the 5th year of studying, indicators of emotional stability and emotional excitability are equal among both rural and urban students.

A high rate of reaction is significantly manifested by rural 1st and 3rd year students. Slowness is more evident among both rural and urban 5th year students.

High rates of extroversion, activity and plasticity of the nervous system were found among the great number of first-year students living in rural areas. This makes it possible to conclude: a decrease in the adoptive capacity at the physiological level forces the individual to become more active in the process of adapting to the new conditions of life (adaptation to training at the university).

Temperament and personal features affect the physiological functions and psycho-emotional sphere of a person. Determination of the influence of personal characteristics and individual reactivity in typical stressful situations is necessary to assess the adaptive capacity of the body. In this regard, the diagnosis of character's features and temperament was made (Questionnaire of H. Smishek).

When diagnosing the character types, the following is revealed: hypertension is accentuated by major number of girls in all studied groups. The presence of hypertension is evidence of activity, vigor, optimism of the personality and the ability to adapt to difficulties [10].

Jamming – a characteristic feature of the insistent, stubborn type of personality is revealed mostly among urban students in all studied groups and is displayed among the 5th year students. The indicator is also normal among most rural girls, but it is not so well displayed than among urban girls.

Persons with accentuated cyclotomicity are characterized by alternation of the periods of a smooth mood, then periods of ascent with high mental activity and periods of decline with lowering of mood and lethargy [8]. It was revealed that cyclotomicity is characteristic for 1st and 3rd year students, both rural and urban.

Such feature of character as pedantry is not characteristic of all the girls under study. Anxiety was found in a small group of the 1st year students, both rural and urban girls.

So we can conclude that most of the girls do not have an exaggerated attachment to a certain order, they can quickly turn to something new, are internally ready for changes, without internal tension and hesitation in decision-making. The accentuation of demonstrativeness was found only among a small number of students, both rural and urban girls.

Some girls have an accentuation of exaltation, and this indicator is at low level only among the 5th year students. The accentuation of excitement was established among a large number of girls in all studied groups. The type of personality, accented by excitement, is characterized by constant internal tension, aggressiveness, irritability and a tendency to conflict [10].

IV. CONCLUSION

Dysthymia was found among a small number of both rural and urban girls in all studied groups. Dysthymia manifests itself in anguish, depression and anticipation of trouble [1].

Thus, the analysis of diagnostics of the types of accentuation of character features shows that hypertension and jamming prevail among a significant number of girls, persons with a predominance of these features possess sufficient adaptability to difficulties and changes in life situations.

A part of the 1st and 3rd year students, both rural and urban, have such predominant features as pedantry, anxiety, demonstrativeness, exaltation, when the prevalence of the above characteristics among the 5th year students is not identified, the tendency to accentuation is tracked. This indicates a greater balance and at the same time plasticity of the personality as a whole. Thus, girls living in the Northern Trans-Urals often show character features that allow them to communicate constructively in the social environment and therefore adaptation to new conditions occurs with fewer costs of functional reserves.

Based on the results of this study, it is possible to determine the functional and psychological state of urban and rural girls at the age of 17-22 living in the conditions of the Northern Trans-Urals, as well as to determine the level of their adaptation to the process of studying at the university. The obtained data of physiological and psychological characteristics of girls can be used as the basis for the development and implementation of measures aimed at correcting disadaptive disorders. This, in turn, becomes an important condition for maintaining the health of girls in the process of studying at the University, especially under environmental pressure.

The obtained data on the assessment of morphofunctional and psychophysiological state of the organism of rural and urban girls at the age of 17-22 living in the conditions of the Northern Trans-Urals should be taken into account by medical workers and teachers in the implementation of innovative training programs at Universities. When carrying out medical and preventive and recreational activities at Universities to maintain a high level of students' health, it is necessary to take into account the peculiarities of ontogenetic adaptation of the body of rural and urban girls. The revealed differences in the morphofunctional parameters of girls developing in the conditions of the industrial city and the village should be taken into account in the organization of the educational process and the selection of physical activity on the subject "Sport", as well as in the planning of mass sports- and health-promoting activities at the universities of the Tyumen region.

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