Health Problems of Students in the Modern Conditions of the Educational Process

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Abstract
In order to study health status of modern students, the results of complex medical examinations of 155 18-19 year old students of Arzamas Branch of Nizhny Novgorod State University (55 boys and 90 girls) at the Health Centre in Arzamas have been used. The program included a survey questionnaire, anthropometry, determination of biological age, cardiointervalography. It has been revealed that the majority of modern students have an accelerated pace of aging. The high level of adaptive capacity of most students is achieved by paying a high price of adaptation on the background of the increased rate of the biological age course, which can lead to premature expenditure of internal resources and depletion of the body, resulting in different functional abnormalities and diseases.

Keywords: health; students; biological age; accelerated/decelerated rate of aging; adaptation

1. Introduction

Research on the university students’ state of health show that having entered any university students have to adapt to a complex of new factors that are specific for higher school (Panihina, 2011). Educational and scientific activities of students in recent years have changed so much that their adaptive-compensatory mechanisms do not always cope with requirements and workloads. It can provoke exhaustion, failure of adaptation and diseases. Most of the researchers link the problem of deterioration of students’ state of health in modern conditions of the educational process to the inability of young people to confront social, political and economic transformations of the society (Ushakova, 2007).

The unfavourable trends are associated with a deficit of nighttime sleep, excessive length of self-instruction, low motion activity, eating disorders. To date, health problems have become even worse due to the

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reduction in the number of free places in the admission to universities, the decrease of the scholarship amount and the need to combine study with work. The greatest difficulties in this connection are experienced by non-resident students. Special care must be taken of students from single-parent families, since scientists and pediatricians studying their state of health conclude that they are much more susceptible to acute and chronic diseases (Agadzhanyan, Degtyarev & Rusanova, 1997).

It is important for students to have good health, first of all, because it has been noticed that there is a close relationship between health and education: the better the students’ health, the more productive their learning. Student life is very busy and diverse, overstraining the nervous system. The load, especially during the examinations, increases significantly up to 15-16 hours per day. Chronic lack of sleep, breaking of the daily routine and rest, diet violation, and intensive information load can lead to a nervous and mental breakdown (Raevskij & Kanishevskij, 2008).

One of the important tasks for ensuring strengthening of students’ health is timely diagnostics of health, of its quantity and quality. Currently, the most actively developing area is the one based on the assessment of the level of health in terms of the theory of adaptation. According to this concept, health is seen as the body's ability to adapt to environmental conditions, and illness - as the result of failure of adaptation; the adaptive response of the organism is assessed primarily in terms of the circulatory system (Kalyuzhniy et al., 2014).

Assessing the level of health using V.P.Voytenko’s method for determining the integral biological age allows us to give an objective description of the functional state of the organism as a whole [6]. Biological (or functional) age allows us to determine the rate of aging and it is an informative indicator of young people’s health. According to the conducted computer diagnostics, students’ biological age is 10-15 years ahead of their passport age; in addition, the majority of young people exhibit the accelerated rate of aging. Biological age can serve as a sufficiently accurate and early indicator of premorbid conditions; it can quantitatively characterize the state of health and the effectiveness of adaptation to unusual environmental and occupational conditions (Raevskij & Kanishevskij, 2008).

There is a close relationship of vegetative status and the biological age of the organism. The predominance of the tone of the parasympathetic division of the autonomic nervous system in people with minimum values of biological age suggests that the adaptation of their organism is accomplished at the expense of trophotropic influence aimed at maintaining homeostatic balance. Individuals with the highest values of biological age have the predominance of an ergotropic influence in the process of adaptive rearrangements to ensure their adaptation to changing environmental conditions (Vojtenko, 1991).

Many researchers believe that the work to overcome the negative trends in students’ state of health and lifestyle should be carried out at the stage of primary prevention. It is focused on the early detection of persons with high-risk behavior and the introduction of health measures in their lifestyle (Kalyuzhnyj, Mihajlova & Maslova, 2014). In Arzamas Branch of NNSU, organization of complex preventive medical examination of students at the Health Centre allows early detection of variations in the state of health and timely beginning of treatment (Puzanova & Vyalov, 2014).

Special disciplines the subject of which is health and a healthy lifestyle help students learn the necessary rules regarding personal hygiene, rest and sleep. These disciplines are designed to promptly inform the students about the harm of bad habits, the role of wholesome and proper nutrition in the formation of a young body, etc.

The aim of the conducted study was to examine the quality of modern students’ health using a variety of techniques.

2. Methods and organization of research

The research was performed on the basis of the results of comprehensive medical examinations of 145 18-19-year-old students (55 boys and 90 girls) at the Arzamas Health Center, including questionnaires, anthropometry and cardiointervalography. Biological age was calculated by V.P.Voytenko’s method:

- for boys = 27,0 + 0,22•SBP – 0,15•DBaDB + 0,72•ISH – 0,15•SB.
- for girls = –1,46 + 0,42•P_{ВР} + 0,25•BW + 0,70•ISH – 0,14•SB,
- SBP - systolic blood pressure, DBP - diastolic blood pressure (mmHg)
- P_{ВР} - the difference between SBP and DBP, DBaDB - duration of breath-holding after a deep breath
- BW - body weight, SB - static balancing, ISH - the index of self-rated health (score).

The results were distributed with identifying the functional classes by the rate of aging:
1. The state of health is very good.
2. The state of health is good.
3. The state of health is average.
4. The state of health is poor.
5. The state of health is very poor (Vojtenko, 1991).

To assess the degree of adaptation to the environment, classification proposed by P.M. Baevskij et al., was applied, using parameters of cardiointervalogram (Baevskij & Berseneva, 1997). Conditions caused by the adaptive reactions of the organism were characterized by the degree of the strain of the regulatory systems:

1. The state of norm or a satisfactory adaptation to environmental conditions.
2. The state of high functional strain of adaptation mechanisms under which the optimal adaptability of the organism is provided by a higher than normal strain of regulation systems.
3. The state of overstrain or poor adaptation characterized by a reduced functional capacity of the organism.
4. The state of the exhaustion of regulatory systems or failure of adaptation - a state with a sharp decline in functional abilities of the body due to the breaking of compensation mechanisms.

According to the survey results a personalized database has been created. The statistical processing was performed using the office suite «EXCEL 2007» and «Biostat». To perform the tasks of research, variation statistics methods and the method for assessing the reliability of results (criterion $\chi^2$) with a confidence interval $p<0,05-0,001$ (Glanc, 1998) were used.

3. Results and discussion

Assessment of the students’ state of health based on the results of medical examinations allows the analysis of the prevalence of illness among students (Table 1). In Arzamas Branch of the UNN, incidence among students is monitored within the research (Kalyuzhnyj, Mihajlova, Kuzmichev & Maslova, 2012).

### Table 1. Analysis of the structure of students’ morbidity, %.

| Functional abnormalities, disease                  | 2009 year | 2011 year | 2014 year |
|---------------------------------------------------|-----------|-----------|-----------|
| Endocrine system diseases                         | 4,1       | 3,5       | 1,5       |
| Diseases of the nervous system                    | 5,7       | 14,1      | 11,9      |
| Diseases of the eye                               | 25,1      | 33,4      | 28,6      |
| Diseases of the ear                               | -         | 0,8       | 0,3       |
| Diseases of the circulatory system                | 15,3      | 14,7      | 5,1       |
| Respiratory diseases                              | 0,5       | 2,1       | 4,7       |
| Diseases of the digestive system                  | 18,4      | 22,7      | 10,4      |
| Diseases of the musculoskeletal system            | 13,6      | 14,2      | 23,6      |
| Diseases of the genitourinary system              | -         | 1,3       | 1,9       |
| No diseases and functional abnormalities          | 15,3      | 12,1      | 20,7      |

Throughout the study period the most common are eye diseases. To date, the incidence rate for the circulatory system and the digestive system has decreased. At the same time the incidence rate for the musculoskeletal system and the respiratory system has increased. There is an 8.6% increase in the number of students who do not have diseases and functional abnormalities.

The answers in the test "Subjective assessment of health" have shown that students in most cases make a positive evaluation of their health: 42.0% of students rated their health as "good", 58.0% - "satisfactory"; the grade "poor health" in the process of questioning has not been received. Average ($M \pm \sigma$) self-rated health scale HEALTHY-UNHEALTHY (from 0 to 29 points) among boys was $5,5 \pm 2,79$, and among girls - $6,2 \pm 3,22$. The most frequent complaints of ill-health students were as follows: “There are times when due to stress I cannot sleep”, “In recent years my eye sight has become worse”, “A change in the weather influences my health”, “I feel giddy.”

Using morphofunctional indicators and data profiles obtained during anthropometric measurements, biological age boys and girls was determined. The resulting estimates were divided into five functional classes characterizing the rate of aging (biological age) and the students’ state of health (Table 2).
The results indicate that 74.5% of boys and 51.1% of girls have an accelerated pace of aging, and among boys 17.7% more students exhibit sharp acceleration in the course of biological aging than among girls. The presented pattern of biological aging estimates and of the health of today's university students causes sincere concern, especially with regard to young men: 40.4% of them need medical and instrumental examination and medical rehabilitation (among the girls - 22.7%). Studies conducted among students show low level of young people responsibility for their health, they have no desire to strengthen it and to use health improving treatments and methods to restore their health. The reasons they name are high level of learning load, lack of free time, financial difficulties and lack of medical and hygienic knowledge; although the students have high level of motivation for a healthy lifestyle (Mysina, 2011).

In order to determine the impact of biological age indicators on the level of adaptation, a distribution of scores of students’ pace of aging and state of health in accordance with the level of adaptation to the environment was made in the course of the study (Table 3).

Table 3. Distribution of students by the rate of biological age and level of adaptation, %

| Rate of aging (biological age) and state of health | Satisfactory | Stress adaptation mechanisms | Unsatisfactory | Failure of adaptation |
|---------------------------------------------------|--------------|------------------------------|---------------|----------------------|
| Very slow (-9.0 or less) State of health is very good. | 4,1          | 4,7                          | 0             | 0                    |
| Delayed (-8.9 to -3.0) State of health is good. | 20,5         | 9,2                          | 10,7          | 14,8                 |
| Biological age is equal to the passport one (-2.9 To +2.9) State of health is average. | 38,7         | 15,7                         | 13,7          | 33,1                 |
| Accelerated (3.0 to 8.9) State of health is poor. | 22,7         | 29,9                         | 37,8          | 23,1                 |
| Accelerated sharply (9.0 or more) State of health is very poor. | 14,0         | 40,5                         | 37,7          | 28,3                 |

Statistics $\chi^2 = 42,85$, $p = 0,0422$

Among students with satisfactory adaptation of the organism 24.6% of individuals have a slower pace of aging. For other categories of adaptation of an organism, the number of young people with a slower rate is in the range of 10.7-14.8%. An ambiguous result was obtained for students with satisfactory adaptation and at the stage of adaptation failure: among them there are almost equal proportions of students (38.7% and 33.1%, respectively) whose biological age is equal to the passport age. The rapid acceleration of aging in equal proportions is seen among students with strained adaptation mechanisms and poor adaptation: 40.5% and 37.7%, respectively. 14.0% of students having satisfactory adaptation on the background of sharp acceleration in the rate of aging pay high price for an optimal balance with the environment.
Among the surveyed students 34.6% of boys and 33.1% girls are from single-parent families. In most cases these are families with single mothers, which impairs their social formation and psychological development. It was determined that 47.2% of boys and 38.7% girls are nonresident. Analysis of the study of the number of students from single-parent families, depending on the place of residence, showed that among urban students their number is 13.3% greater than among the young people from rural areas. High values of the identified factors can be explained by the fact that this university is a budgetary institution, so the majority of the students study for free, therefore students from families experiencing social and economic difficulties can afford studying there.

To determine the influence of social factors on the rate of biological age, we made a distribution of students from different social groups by functional classes. We discovered that students with one parent have a faster pace of aging than students from two-parent families. The accelerated rate of aging is higher with boys and girls from rural areas, in contrast to the students living in the place of study. Slow pace of aging is determined in 25.8% of two-parent families and 15.7% of one-parent families. In the analysis of the factor of "place of residence", slow rate is shown by 22.3% of urban students and 15.7% of students from rural areas. Among the students whose biological age is equal to that in the passport, 9.5% more are young people from two-parent families and 15.0% more are students from cities.

According to the results of questionnaires it was found that the total number of smoking students in the institute is 1% (23.2% - young men, 8.8% - girls), students from two-parent families smoke three times less (7.8%) than students from single-parent families (24.4%).

4. Conclusion

The most widespread among students are eye diseases, diseases of the musculoskeletal and respiratory systems. Self-reported health among students is high, which is typical for young people. They make little effort to preserve and strengthen their health; they do not pay attention to the first symptoms of an illness, to the body warning of possible disorders.

74.5% of boys and 51.1% of girls have an accelerated rate of aging; moreover, among young men, the number of individuals with sharp acceleration in the rate of aging is 17.7% greater. Determination of students’ biological age can contribute to their reorientation to a healthy lifestyle, a key to a more successful skill training.

High level adaptive capacity for the majority of students is achieved by the high price of adaptation on the background of the accelerated rate of biological age, which may lead to premature spending of internal resources and depletion of the body, resulting in various diseases and functional abnormalities.

During the comparative analysis it was found that social factors have a significant impact on the health of today's students. Nonresident students and students from single-parent families experience additional difficulties in the process of higher education. The results necessitate taking measures and developing a program that includes psychological and material assistance to students seeking to live a healthy lifestyle.

Thus, despite the high assessment of their own health, students have serious health problems. The comprehensive medical examination of students of Arzamas Branch of NNSU at the Health Center allows early detection of abnormalities in the students’ state of health and the timely treatment of the diseases.

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