CHAPTER 3
THEORY AND METHODS OF VOCATIONAL EDUCATION

SOCIAL AND ENVIRONMENTAL FACTORS DETERMINING THE HEALTH STATE OF YOUTH STUDENTS IN UKRAINE

Viktoriia Davyskyba[1], Vitalii Honcharuk[2], Natalia Horbatyuk[3]

[1]Senior Lecturer of the Department of Chemistry and Ecology, Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine, e-mail: v.v.davyskyba@udpu.edu.ua, ORCID: https://orcid.org/0000-0002-3900-9745

[2]Ph.D. (Pedagogy), Associate Professor, Department of Chemistry and Ecology, Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine, e-mail: gvitalii1975@gmail.com, ORCID: https://orcid.org/0000-0002-3977-3612

[3]Ph.D. (Pedagogy), Associate Professor of the Department of Chemistry and Ecology, Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine, e-mail: NatalyaG@i.ua

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Abstract. *One of the bases of sustainable development of mankind is the health of the young generation. The priority of this issue is especially important in the perspective of European integration processes in Ukraine. Youth is an important component of the human resource that every state should take care of. Preserving, restoring and improving the psycho-physiological condition of young people is the key to the survival and further progress of mankind. The purpose of our research is to analyze the importance of individual factors and their combinations that can affect the health of students. Analysis, synthesis and modeling methods were used to study the state of research. The results of our research were carried out with the help of empirical methods: pedagogical observation, questionnaires, interviews, testing, the method of experimental evaluations. Mathematical statistics methods were used to process the research results. This study explores the social and environmental factors affecting the health of university students in Ukraine, emphasizing the importance of promoting a healthy lifestyle among youth. The research highlights the role of education in shaping health culture, noting gaps in the current system's approach to instilling necessary attitudes toward health. The study draws on data from student health assessments and reveals a high prevalence of chronic diseases, especially among students from radiation-contaminated areas. The investigation further examines the genetic and immunological markers influencing students' health, finding that prolonged stress, radiation exposure, and physical inactivity significantly impact immune responses. Additionally, the research explores the link between thyroid and lipid metabolism issues and students' exposure to ionizing radiation. The findings suggest that moderate physical activity and immunomodulators may help mitigate stress-induced immunosuppression. The study concludes that addressing these social and environmental health determinants is critical for improving the well-being of Ukrainian youth and calls for tailored physical education programs and preventive health measures.*

Keywords: *environmental factors, students of Ukraine, education, values, competences, human health.*

JEL Classification: I 23, I 29

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Introduction. Under the current conditions of our country's development, the scale and pace of scientific and technological progress, the intensification of the national economy depend in many respects on the health, qualifications, competence of personnel and their high level of civic responsibility. The modern Ukrainian education system is focused on the development of young people's ideas about health, as well as the formation of strategies and technologies in the field of health, however, educational institutions do not pay due attention to the development of students' "necessary" society's attitude to health, the formation of a culture of health self, which reflects the harmony and integrity of a person as an individual, the adequacy of his interaction with the surrounding world and people, as well as the ability for creative self-expression and active life. The priority is the spread and promotion of healthy lifestyle skills, including rational nutrition, improvement of hygienic culture, physical activity, prevention of habits harmful to health, optimistic outlook, rational stereotypes of the population's behavior in various life situations, ensuring awareness of the responsibility of the community and a specific person for the preservation and improvement of one's health and the health of family members, development of sports, physical culture and preventive sphere in order to meet the needs of the country's population in health improvement, prevention of diseases, restoration of physical and spiritual strength of a person. A review of the medical, pedagogical, cultural literature allows us to state that today there is not only an acute need for pedagogical research into the process of formation and development of health culture, but also the possibility of its improvement, conditioned by a deep theoretical understanding of the problem and the development of new methodological approaches to the study of the process of culture formation health of students. In response to this global problem, WHO established the Commission on Social Determinants of Health in 2006 to review the evidence, engage in social debate and recommend policies to improve the health of the world's most vulnerable people. The main focus of the Commission's actions was to translate public health knowledge into policy action: to share evidence on what can be done to improve health equity and how to contribute to a global movement to achieve this goal, on the global collaboration of policymakers, researchers and of civil society led by commissioners with a unique combination of policy, academic and advocacy experience.

The commission's fundamental focus was on countries by their levels of income and development. Various approaches to understanding the social determinants of health were examined and summarized. In response to widening gaps within and between countries in levels of income, opportunity, life, life expectancy, health, and access to health care, the WHO Commission on Social Determinants of Health published a report in 2008, Closing the Generation Gap – Equitable attitudes to health through measures of social determinants of health". In 2010, WHO published another important report, On Equity, Social Determinants and Public Health Programs, with the aim of translating knowledge into concrete, effective action.

The results of the study were summarized and synthesized into a single conceptual basis for actions regarding social determinants of health: highlighting the difference

between the levels of causes, distinguishing the mechanisms of the emergence of social hierarchies and the conditions of everyday life.

Literature review. Analysis of current research and scientific publications shows that this problem seriously worries N. Abaskalov, V. Andrushchenko, V. Afanasyev, S. Yermakov, I. Zyazyun, V. Kremen, A. Kuzminsky, V. Ponomaryova and many others scientists Scientists study human health as a philosophical, social, economic, biological, medical category, as an object of consumption, additional capital, individual and social values, a dynamic phenomenon of a systemic nature. "Personal health is considered as an interactive characteristic of the quality of an individual's spiritual, mental and physical development, which ensures his full participation in various spheres of social life and activity as a subject of work, knowledge, communication and creativity" [3].

Is it not necessary to worry about the health of students in classrooms? Since the state of health is one of the decisive factors in the formation of personality, it is logical to put forward a hypothesis about the high efficiency of personally oriented technologies (OOT) in solving the given problem. It is well known that the purpose of OOT is to maintain and develop the child's natural qualities, his health ... [4, p. 44].

Aims. The purpose of our research is to analyze the importance of individual factors and their combinations that can affect the health of students.

Methodology. Analysis, synthesis and modeling methods were used to study the state of research. The results of our research was carried out with the help of empirical methods: pedagogical observation, questionnaires, interviews, testing, the method of experimental evaluations. Mathematical statistics methods were used to process the research results.

Results. The increase in the level of morbidity among Ukrainian citizens, the decrease in their work capacity, the pronounced deterioration of the physical, mental, and intellectual development of young people, the radical socio-political transformation of society, actualize the problem of preserving the health of university students. The problem posed is related to the important scientific and practical tasks of forming a healthy young generation of the Ukrainian nation, for which human life and health are recognized as the highest values, and according to UN Resolution No. 38154 from 1997, they are an indicator of civilization, the main criterion of expediency and effectiveness of all spheres of state activity. In particular, the analysis of the results of medical examinations of students of the Cherkasy National University showed that out of 5122 examined, only 1926 (37.6%) students were classified as healthy (I health group) and almost healthy (II health group), then as 3196 (62.4%) students, i.e. the vast majority, were diagnosed with chronic diseases, as a result of which they were assigned to III and IV health groups and needed a complex of health and rehabilitation measures. At the same time, among the persons who came to study from the territories of enhanced radio-ecological control - students from Chernobyl - (141 persons), the specific weight of patients is even higher - 64.83%, and the correspondingly reduced number of healthy - 35.17% [5, p. 19].

Currently, it is known that markers of the strength and direction of the immune response under the influence of adverse exogenous factors can be genetically

determined leukocyte, erythrocyte, and serum blood factors. The genetic markers of blood, which to one degree or another determine the ability of the body to develop protective and immunological reactions to various antigens, include genes and their protein products of the HLA, AB0, Rhesus factor systems, blood serum systems - haptoglobins, phosphoglucomutase, acid phosphatase, etc. [6, p. 413].

The results of our research showed that the degree of contribution of isolated genetic blood systems to the formation of immunoreactivity of the human body is ambiguous. By importance, they are located in the following order: HLA (DR, B, A), Rh, AB0, Hp. The genetic predisposition to immunological disorders according to the systems of leukocyte and erythrocyte antigens, in particular under the influence of negative exogenous factors, depends on the quantitative and qualitative composition of the phenotypic characteristics of an individual, the totality of which essentially determines his place in the risk group for the realization of pathological conditions at the level of the immune system. Admission of young people to higher education institutions and studies in primary courses is a significant psychological stress that requires adaptation of the body to new conditions of life and activity and causes compensatory functional restructuring.

The learning process in higher educational institutions leads to overstraining of adaptation mechanisms. Overvoltage especially increases during the assessment and examination period, this can become a potential cause of health problems among student youth. Acute short-term stress brings innate immunity to the fore, which does not require such energy expenditure and time as specific. Prolonged stresses cause a transition from adaptive changes in the immune system to dysfunctions, first at the level of cellular immunity, and then at the level of the general immune response [7, p. 19, 11-13]. We found that during the exam session, students had stress-induced changes in indicators of non-specific and specific immunity. In particular, the level of functionally mature T-lymphocytes and their subpopulations that perform helper functions, natural killers, which play a leading role in antitumor and antiviral immunity, and the level of the main serum immunoglobulin G decreased in the examined subjects. However, the detected changes, in the vast majority, did not beyond physiological homeostatic norms, that is, they were not pathological, but adaptive in nature and, to a large extent, depended on combinations of genetic factors in the blood of the examinees [8, p. 114]. In recent years, the role of metabolic processes, in particular, lipid metabolism, in the realization of the functions of the immune system has been analyzed in detail in the scientific literature.

Research results show that mild and moderate hypercholesterolemia corresponds to greater functional activity of the immune system. It is believed that the level of total cholesterol should be in the range of 6.0-6.5 mmol/l for the optimal operation of certain links of the body's natural resistance. At the same time, we found that a significant part of student youth, in particular, in persons with certain health disorders, had a cholesterol level at the lower limit of the homeostatic norm. A significant part of students' daily life takes place indoors. As a result, they have a lack of motor activity.

The close relationship between the health of student youth and physical capacity with the way of life, the volume and nature of daily activities is proven by studies that

show that optimal physical activity in combination with a rational diet and the right lifestyle is the most effective way to overcome various deviations in health 'I. The role of an optimizer of physical exertion in relation to students is given to a carefully thought-out physical culture. We have established that moderate physical exertion, caused by physical education, causes a redistribution of indicators of the cellular link of immunity in favor of the non-specific link, which indicates the presence of a moderate stress effect. That is, there is training for possible stress loads of greater intensity, which can be considered a positive factor.

A significant part of the population of Ukraine lives in the territories of enhanced radioecological control (as a result of the accident at the Chornobyl NPP). The group of students from radiation-contaminated territories was made up of people who came to study from Katerynopil, Lysyan, Zvenigorod and Kaniv districts. These are territories with a density of soil contamination with cesium-137 isotopes of 1-5 Ki/km2.

It was established that the cortisol content was at the upper limit of the homeostatic norm and was significantly increased compared to controls in persons who were exposed to prolonged exposure to small doses of radiation. That is, the examinees have a chronic stress condition. The obtained data are consistent with reports of an increase in the level of anxiety on the verge of depression in 10.0-20.6% (according to various criteria and depending on age) of Ukrainian schoolchildren aged 7-17 who lived in territories contaminated with radionuclides [8-9]. Immunological monitoring revealed a redistribution of indicators of the cellular link of immunity in favor of granulocyte fractions. The relative and absolute number of rod and segmented neutrophils increased, and lymphocytes decreased.

Moderate immunosuppression of the T-cell link of immunity was also observed, which was manifested by a decrease in the relative and absolute number of lymphocytes expressing CD3, CD5, CD4 and CD16 antigens. The examined subjects had a reduced immunoregulatory index CD4+/CD8+ and an increased concentration of serum IgG. Therefore, the existence of a stressful situation is confirmed in this cohort.

Literary sources indicate the possibility of inhibiting the processes of differentiation and proliferation of immunocompetent cells, their redistribution between immunocompetent organs, and changes in antibody production both under stressful conditions and under the influence of small doses of radiation. That is, for this category of students, the combined effect of two factors capable of suppressing immunoreactivity is possible. This makes them a risk group for the development of various diseases. The analysis of indicators during the examination session, as a factor of increased emotional stress, revealed a probable increase in cortisol content and strengthening of trends characteristic of the intersessional period in students from radiation-contaminated areas. In particular, the relative and absolute number of lymphocytes decreased even more against the background of an increase in the number of neutrophils in the peripheral blood. The relative and absolute number of helper T-lymphocytes with the CD4+ phenotype, as well as the immunoregulatory index in a significant part of the examined subjects, reached values lower than the homeostatic

norm. The content of IgG, increased in the intersession period, became probably lower than both the control and the values obtained in the absence of additional psycho-emotional stress [10, p. 53].

The severity of immunosuppression and the effectiveness of the recovery process after emotional stress in students from radiation-contaminated territories were influenced by immunogenetic factors of the blood, especially the erythrocyte system AB0 and serum Hr. The combination of phenotypes 0(I) and B(III) according to the AB0 system, Rh- according to the "Rhesus" system, and Hp2-2 according to the haptoglobin system turned out to be the most pressing. The protective tendency is most pronounced in the combination of A(II), Rh+ and Hp2-2 phenotypes. Therefore, the assessment of immunogenetic factors of blood available for analysis in the population of radiation-contaminated territories can be an important prognostic marker of the development of immunoreactivity pathologies.

The analysis of statistical data showed that during the period from the time of the accident at the Chernobyl nuclear power plant to 2015, 1,452 patients with a diagnosis of "thyroid cancer" were registered in the oncology dispensary. 34.9% of them were residents of territories contaminated with radionuclides. Among the patients of the oncology clinic are 85 people under the age of 30, that is, those who were not directly exposed to radioactive iodine. 57 of them are residents of territories contaminated with radionuclides. Taking into account the high risk of thyroid pathologies in persons exposed to the factors of the accident at the Chernobyl nuclear power plant, we analyzed the thyroid status of students in this category.

A wide variation in the concentration of thyroid hormones (T3 and T4) in peripheral blood was revealed. According to these indicators, the examined were divided into groups with euthyroidism, hyperthyroidism, and hypothyroidism. These groups included persons without clinical manifestations of thyroid gland pathology. The most pronounced changes in indicators of cellular immunity were noted for the group of hypothyroidism.

Discussion. Thus, the decrease in the level of T3 led to the suppression of the level of functionally mature T-lymphocytes, in particular, due to their helper subpopulation with the CD4+ phenotype. The results of our research are consistent with the data, in which the inhibition of certain links of cellular immunity is noted in individuals with thyroid pathologies, in particular, hypothyroidism. It is known that thyroid hormones are able to stimulate biosynthetic processes in immunocompetent cells and, accordingly, their proliferation. Ionizing radiation, causing damage to thyrocytes, causes a deficiency of thyroid hormones, which, in turn, causes compensatory processes that lead to hyperproduction by full-fledged T3 and T4 cells. In the future, if the destructive influence continues, there is a gradual exhaustion of the functions of the thyroid gland, the consequence of which is the development of peripheral hypothyroidism.

Analysis of individual indicators of lipid metabolism showed that chronic exposure to small doses of ionizing radiation caused by living in areas contaminated with radionuclides led to an increase in the level of total cholesterol, which was especially pronounced in people with signs of vegetative-vascular dystonia syndrome.

The level of cholesterol was correlated with certain immune indicators, which may indicate its inclusion in compensatory processes and a certain role in their effectiveness.

Conclusions. Moderate loads caused by physical education led to the formation of short-term compensatory changes in indicators of the cellular link of immunity within the homeostatic norm in students from radiation-contaminated areas, with effective and rapid recovery. Given the presence of immunosuppression caused by chronic exposure to small doses of ionizing radiation, it is necessary to carefully select exercises according to their duration and intensity, giving preference to physical therapy complexes. It is also desirable to use non-specific immunomodulators in parallel, in particular, certain vitamin complexes, which have demonstrated a protective effect during the effects of a stressful nature. Given the presence of immunosuppression caused by chronic exposure to small doses of ionizing radiation, it is necessary to carefully select exercises according to their duration and intensity, giving preference to physical therapy complexes. It is also desirable to use non-specific immunomodulators in parallel, in particular, certain vitamin complexes, which have demonstrated a protective effect during the effects of a stressful nature.

Author contributions. The authors contributed equally.

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