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APPROACHES TO IMPROVING THE NUTRITIONAL STATUS OF UNIVERSITY STUDENTS

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Abstract. *Physical development is an important indicator of the harmonious formation of the human body and overall health. During ontogeny, it is shaped under the influence of biological laws and social living conditions. Morphofunctional characteristics, particularly anthropometric indicators, allow for the assessment of general developmental patterns and the impact of natural-climatic, sanitary-hygienic, and socio-domestic factors. The analysis of student youth data, especially the body mass index (BMI), enables the identification of nutritional status disorders and the development of lifestyle correction recommendations. Special attention is given to the role of a balanced diet enriched with vitamins and minerals. A number of lifestyle features are outlined that may lead to deficiencies in essential nutrients, along with ways to restore them. The text also highlights the importance of mineral metabolism and the consumption of mineral waters, which contribute to the normalization of water-salt balance and disease prevention.*

Key words: *nutritional status, micronutrients, vitamins, physical parameters.*

Introduction.

Physical development is one of the most important indicators; it reflects the harmonious development of the organism and the state of human health. The process of physical development in ontogeny follows natural biological laws and is adjusted by the social conditions of human life and activity. Thus, physical health is influenced by both endogenous or genetic factors (morphofunctional characteristics and innate immunity) and exogenous factors (environmental or natural, and socio-economic elements of the environment).

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immunity) and exogenous factors (environmental or natural, and socio-economic elements of the environment).

Main text.

Anthropometric indicators of the body reflect its morphofunctional characteristics and help assess the nature of the most general patterns underlying human development. The morphological characteristics of an individual can be considered as informational criteria of the peculiarities of developmental processes and serve as markers in the study of the effects of natural-climatic, sanitary-hygienic, and socio-domestic factors on the organism.

The analysis of anthropometric data of individuals from various age groups is one of the key prerequisites for developing a wide range of recommendations for sectors related to the preservation and enhancement of public health. These include recommendations on healthy lifestyles, proper nutrition, the implementation of physical culture, and the organization of time management and leisure activities for different population groups.

Determining height-weight indicators and the Quetelet index among student youth is of interest for the purpose of correcting the nutrition of individuals in this age group. Body mass is a primary measure of fat accumulation in the body and an indicator of nutritional status. However, the absolute values of body mass largely depend on a person's height. Therefore, to diagnose nutritional status, the characteristic used is the ratio of body mass to height: the body mass index (BMI).

The study of these indicators among second-year female students showed that the BMI was 20.16 (Kitsula L.M., 2024), which also falls within the normal range according to WHO classification, with an average height of 165.9 ± 0.80 cm and weight of 55.5 ± 1.29 kg. However, the author notes that 38,4% of the female students were found to have insufficient body mass [7].

Undoubtedly, the body weight of females is influenced by contemporary social and cultural norms, public opinion, and social media. Nevertheless, objective factors should not be overlooked: lifestyle, daily routine, frequency and nutritional adequacy of meals. Modern nutritional science sets as its primary goal the alignment of

population nutrition with the biological optimum, in order to ensure favorable conditions for maintaining quality of life and working capacity of the population.

Quantitative assessment of nutrition includes two main concepts: actual nutrition (actual food intake) and nutritional status (nutritional condition, level of nutritional adequacy). These two concepts are often applied inadequately or are conflated. Actual nutrition refers to a person's habitual diet, which includes the composition and quality of consumed food products, methods of culinary processing, and the meal schedule [7].

Nutritional status is the result of the influence of dietary patterns and nutrients, which is manifested in objective parameters of the body, its biological media, and components. It can be assessed by measuring body weight and height to calculate the body mass index, as well as through comprehensive laboratory and clinical analyses. Proper nutrition implies the intake of sufficient amounts of energy, proteins, fats, carbohydrates, vitamins, minerals, and water in accordance with the body's needs.

Proper nutrition affects physical and intellectual development, contributes to life extension, reduces the incidence of diseases, enhances work capacity, and creates favorable conditions for adaptation to the environment [4]. As a rule, during student years, young people often neglect the regularity of breakfast or skip it altogether. For lunch, they tend to consume fast food: high-calorie meals lacking sufficient amounts of protein, vitamins, minerals, and dietary fiber.

It is important to remember that a deficiency of minerals and vitamins leads to morphofunctional disorders or the development of pathological conditions, as illustrated in the table (Table 1).

Lifestyle directly affects the level of trace elements in the body: a healthy lifestyle, including a balanced diet, ensures adequate intake of micronutrients, while unhealthy habits may lead to their deficiency and health problems [1]. The need for specific micronutrients depends on individual characteristics such as age, physiological condition, and level of activity (Table 2).

It should be remembered that, unlike some vitamins, macro- and microelements are not synthesized in the human body at all [2]. They enter the body with food products, water, and air. The totality of processes of absorption, distribution,

assimilation, and excretion of inorganic compounds in the body constitutes mineral metabolism. Mineral metabolism is often associated with water-salt balance. An example of this is the centuries-old tradition of consuming medicinal, medicinal-table, and table mineral waters. Mineral waters are complex solutions in which substances are present in the form of ions, undissociated molecules, gases, and colloidal particles.

Table 1 - Symptoms of Vitamin Deficiency

Symptoms	Vitamin deficiency
Stomatitis	B_2,B_6
Pale skin and mucous membranes	A, C, B_{12}, PP, FA
Dry skin	A, C, B_6, Biotin
Acne, boils	B_6, PP, A
Hair problems	A, B_6, Biotin
Diarrhea, intestinal motility disorders	B_{12}, PP, FA, A
Conjunctivitis	B_2, B_6, A
Susceptibility to infections	C, A
Fatigue, weakness	C, B_1, B_2, B_{12}, A, E
Irritability, anxiety	C, B_1, B_6, B_{12}, PP, Biotin
Insomnia	B_6, PP
Photophobia, impaired twilight vision	A, B_2
Decreased appetite	A, B_1, B_2, B_6, B_{12}, Biotin
Nausea	B_1, B_6

A fairly comprehensive classification of natural mineral waters was carried out in the second half of the 20th century. All natural waters are classified according to their composition, properties, and effects on the human body.

Group A. Waters without “specific” components and properties. Their significance is determined only by ionic composition and the level of mineralization.

Group B. Carbonated waters. Their significance is determined by the presence of large amounts of dissolved carbon dioxide, as well as ionic composition and mineralization level.

Group C. Hydrogen sulfide (sulfide) waters. These waters are classified based on the presence of free hydrogen sulfide in their composition and are mainly used for baths.

Table 2 - Lifestyle and Balanced Nutrition

Lifestyle / Habit	Vitamin and Mineral Deficiency	Foods to Replenish Vitamins and Minerals
Active sports	Vit: C, E, B_5 и B_6. M/e: K, Mg, Na.	Meat, sea fish, oranges, greens, nuts, eggs, cauliflower, cheese, beef liver, beans.
Active physical work	Protein. Vit: C, E, B_5, B_6, B_{12}. M/e: K, Mg, Na.	Meat, sea fish, oranges, greens, nuts, eggs, cauliflower, cheese, beef liver, beans.
Vegetarianism	Protein. Vit: B_2, B_{12}, PP. M/e: Fe, Ce	Legumes, soy, nuts, honey, black bread, buckwheat, oatmeal, potatoes, dates, pine nuts, greens.
Restricted diet (consuming less than 1.5 kg of raw fruits and vegetables per week)	Vit: A, B_9. M/e: C, K.	Tomatoes, persimmons, greens, citrus fruits, cabbage, carrots, apples, kiwi.
Craving for sweets	Protein. Vit: A, PP, B_{12}. M/e: F, Cr.	Meat, fish, beans, soy, cheese, milk, cod liver, greens, seaweed, corn.
Frequent alcohol consumption	Vit: B_1, B_2, B_9, Biotin. M/e: Zn, Mg.	Liver, cheese, peas, beans, dairy products, eggs, beets, greens, nuts.
Smoking	Vit: C, B_6, B_{12}. M/e: Ce	Chicken meat, citrus fruits, cabbage (especially broccoli), greens, persimmons, beef liver, seafood.
Constant stress	Vit: C, B_6 M/e: Ca, Zn, Mg.	Chocolate, nuts, bananas, dried apricots, liver, cheese, red meat, beans.
Consumption of large amounts of black tea and coffee	Vit: B_1 и B_2. M/e: Fe.	Buckwheat, beans, liver, rye bread, dairy products.
Frequent use of painkillers	Vit: B_1, B_5, B_9. M/e: Fe, Mg, Ce.	Buckwheat, liver, pomegranate, beets, peas, cauliflower, greens, carrots.
Frequent use of laxatives	Vit: B_1, B_6, C, E. M/e: Ca, K, Zn, Mg, Na, Cr.	Oranges, sea fish, greens, nuts, eggs, cauliflower, chicken, cheese, liver, beans.
Frequent use of antibiotics	Vit: B_1, B_5, B_9, Biotin. M/e: K, Mg.	Liver, egg yolk, condensed milk, beans, cottage cheese, nuts, honey, greens, peas, tuna.
Contraceptive use	Vit: B_1, B_2, B_6, C. M/e: Cu, K, Zn	Chocolate, black bread, sweet pepper, peas, dairy products, bananas, greens, nuts, avocado.
Lack of fish and seafood in the diet	Vit: A, B_{12}, D. M/e: I	Seaweed, iodized salt, mushrooms, butter, mussels, shrimp.
Lack of sunlight	Vit: D. M/e: Ca	Fish oil, cod liver, fatty sea fish, cottage cheese, almonds.

Group D. Waters containing iron, arsenic (As), and high concentrations of Mn, Cu, Al, and others.

Group E. Bromine (Br) and iodine (I) waters, as well as waters with a high content of organic substances. Examples: Naftusia (Western Ukraine), Bramstedt waters (Germany), Fiuggi (Italy).

Group F. Radon (radioactive) waters.

Group G. Siliceous thermal waters. This group includes widely distributed siliceous thermal waters found in nature.

The use of therapeutic and therapeutic-table mineral waters is supervised by medical professionals. Table mineral waters also contain dissolved macro- and microelements, cations and anions [5], but in smaller quantities than therapeutic ones. However, table waters, in addition to replenishing the microelement composition, also contribute to the prevention or alleviation of symptoms of certain diseases. For everyday use, we consume table mineral waters, which are classified according to the predominance of cations or anions.

Chloride mineral water affects the secretion of the stomach, pancreas, and intestines. It helps regulate metabolic processes in the body and restores the functioning of the digestive system.

Bicarbonate mineral water contributes to the reduction of gastric juice acidity. Depending on the dosage, it may either stimulate or inhibit secretion.

Sulfate water normalizes the functioning of the gastrointestinal tract. It is highly effective in cases of diabetes mellitus, chronic hepatitis, bile duct therapy, and issues related to excess weight.

Calcium bicarbonate-sulfate water aids in recovery from chronic intestinal diseases.

Bicarbonate-iodine waters are effective for thyroid gland disorders.

Bicarbonate-sulfate and mineral-organic waters are beneficial in kidney diseases.

Iron-containing therapeutic-table water is used in cases of iron-deficiency anemia.

Bicarbonate-chloride-sulfate water is recommended for chronic gastritis accompanied by reduced gastric secretion.

Chloride-sulfate therapeutic water is prescribed for diabetes mellitus, excess weight issues, chronic intestinal diseases, and bile duct disorders.

Using of table mineral waters in the daily diet can also help restore the body's mineral and water-salt balance.

Summary and conclusions.

Thus, the majority of students exhibit disruptions in their dietary regimen. Both excessive and insufficient nutrition have a negative impact on the body. Excessive nutrition significantly increases body mass, which leads to obesity and, ultimately, to metabolic disorders, cardiovascular diseases, and diabetes. In cases of insufficient nutrition, individuals experience rapid weight loss, deterioration of well-being, reduced work capacity, and weakened immunity. Therefore, to maintain health and quality of life, it is essential to follow the principles of rational, balanced, and adequate nutrition.

It is important to monitor the quality of nutritional components: the presence of vitamins, microelements, and protein in consumed food products. The mineral complex in the body can be partially replenished through the use of table mineral waters.

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Анотація. *Фізичний розвиток є важливим показником гармонійного становлення організму та стану здоров'я людини. У процесі онтогенезу він формується під впливом біологічних законів та соціальних умов життя. Морфофункціональні характеристики, зокрема антропометричні показники, дозволяють оцінити загальні закономірності розвитку та вплив природно-кліматичних, санітарно-гігієнічних і соціально-побутових чинників. Аналіз даних студентської молоді, зокрема індексу маси тіла (ІМТ), дає змогу виявити порушення харчового статусу та сформувати рекомендації щодо корекції способу життя. Особлива увага приділяється ролі повноцінного харчування збагаченого вітамінами та мінералами. Надається низка особливостей способу життя, що можуть привести до недостатку незамінних поживних речовин та шляхи відновлення. Також приділяється увага мінерального обміну та споживанню мінеральних вод, які сприяють нормалізації водно-сольового балансу та профілактиці захворювань.*

Ключові слова*: харчовий статус, мікронутрієнти, вітаміни, фізичні параметри.*