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NUTRITION – A FACTOR OF HEALTH, FOOD SAFETY

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Abstract
This study provides a comprehensive analysis of the hygienic and physiological significance of nutrition in human health and social life. Nutrition, as a key factor ensuring the vital processes of the organism, maintains the balance between assimilation and dissimilation. The human body's need for energy and nutrients is met through proteins, fats, carbohydrates, vitamins, and mineral salts. The paper also analyzes the causes and consequences of alimentary diseases (such as obesity, avitaminosis, and protein-energy deficiency) resulting from improper and insufficient nutrition.

Keywords: Nutritional hygiene; rational nutrition; physiological standards; nutrient balance; alimentary diseases; healthy lifestyle; food culture; public health in Uzbekistan; physical development; medical care; hygienic norms; dietary intake; energy from fats; carbohydrate metabolism; vitamin activity.

Introduction:

Nutrition is one of the key determinants of human health and serves as an essential indicator of both individual and population well-being. In every living organism, assimilation and dissimilation processes constantly occur; if essential nutrients are not supplied through food intake and oxidation–reduction reactions do not take place, the process of assimilation becomes disrupted. As a result, a deficiency of vital nutrients — proteins, fats, carbohydrates, vitamins, and mineral salts — arises, which are necessary to ensure the body's energy supply and sustain all vital physiological processes. Therefore, it is crucial for the human body to receive regular and high-quality nutrition.

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Throughout the human lifespan (an average of 70 years), an individual consumes approximately 2.5 tons of protein, 3 tons of fat, 10 tons of carbohydrates, and about 250 kilograms of table salt. The adequate intake of nutrients not only sustains physiological functions but also plays a decisive role in determining overall health status. It is well established that population health indicators are closely linked to dietary patterns. The quality of nutrition directly affects children's and adolescents' physical development, the working capacity of the labor force, the body's resistance to adverse environmental influences, the overall morbidity rate, and life expectancy. Improper nutrition leads to the progression of many diseases in more severe forms, accelerates their transition to chronic stages, and prolongs recovery periods.

In our Republic, issues related to nutrition have their own specific features. The level of public awareness regarding proper and rational nutrition remains relatively low; even when people are familiar with the basic principles of healthy eating, they often neglect to follow them. A large part of the population lacks access to high-quality food products, while those who can afford them still fail to adhere to the requirements of proper nutrition. In recent years, the hygienic control over food quality indicators has significantly weakened. Furthermore, the nutritional status of people living in remote rural areas is far from satisfactory due to the limited variety and poor quality of available food products.

The resolution of these problems cannot be achieved solely by addressing the existing economic crises in the Republic. It is necessary to conduct broad public awareness campaigns promoting timely, adequate, and high-quality nutrition. At the same time, both domestic and imported food products must undergo strict inspection and certification by relevant authorities. Sanitary conditions and hygienic regulations in markets and food outlets must be rigorously controlled. Moreover, when developing hygienic standards, the country's climate and national traditions should be taken into account.

Since 2006, Uzbekistan has implemented the national program "Ensuring Rational and Adequate Nutrition Among the Population of Uzbekistan Until 2010," which included three main strategic directions:

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1. Organizing proper nutrition according to the population's health status;
2. Ensuring the quality of food products;
3. Maintaining the safety and continuity of food supply.

The optimal ratio of plant-based to animal fats in the human diet should be 1:3 or 2:3, while for the elderly, a ratio of 1:1 is considered more appropriate. The physiological requirement for fats among middle-aged, working individuals varies depending on gender, age, and the type of occupational activity — typically ranging from 80 to 169 grams per day. This requirement can be individually calculated based on the body's protein needs, using the formula: 1 gram of protein corresponds to 1.2 grams of fat.

The main portion of the daily dietary intake consists of carbohydrates, which primarily serve as the body's main source of energy. In addition to their energetic function, carbohydrates also participate in plastic (biosynthetic) processes, and certain types possess specific physiological activities — for instance, ascorbic acid, heparin, and heteropolysaccharides, which play a role in determining blood group antigens.

Among polysaccharides, cellulose (dietary fiber) regulates intestinal function by enhancing intestinal peristalsis, while pectin substances inhibit the growth of putrefactive microorganisms in the intestine and adsorb toxic compounds, facilitating their elimination from the body. Foods rich in carbohydrates that also contain large amounts of fiber are less efficiently absorbed, and excess carbohydrates are more rapidly excreted from the body.

Carbohydrate-containing products with more than 0.4% fiber content are classified as "protected carbohydrates"; such foods are particularly recommended for overweight individuals and the elderly, as they help regulate metabolism and prevent excessive energy accumulation.

The physiological norm for carbohydrate intake can be calculated in relation to protein consumption — approximately 4–4.5 grams of carbohydrates per 1 gram of protein. Moreover, the optimal ratio of carbohydrate types in the diet should be as follows:

- Polysaccharides (including about 2% fiber): 80–90%
- Mono- and disaccharides: 10–20%

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The main sources of monosaccharides are honey and fruits, while polysaccharides are primarily obtained from vegetables and cereal products.

Fats, like proteins, belong to the group of essential nutrients and constitute one of the main components of a balanced diet. They perform a wide range of physiological functions in the human body. Fats provide approximately 27–33% of the daily energy requirement. In addition, they are integral structural components of every cell, play an active role in thermoregulation, facilitate the absorption and transport of fat-soluble vitamins, regulate cholesterol metabolism, participate in the synthesis of hormones, bile acids, and prostaglandins, and contribute to the palatability of food.

The biological functions of fats depend on their properties and composition, which are largely determined by the fatty acid profile. The regulation of cholesterol metabolism is mediated by phospholipids (present in low-density lipoproteins), and these phosphoric acid–containing compounds are synthesized in the human body from dietary lipids. The precursors of phospholipids, or closely related compounds, are abundant in vegetable oils.

It is important to note that additional processing or thermal treatment of vegetable oils often leads to the degradation of phospholipids, which consequently reduces the biological value of the fats. This is particularly relevant to cottonseed oil, since raw or unprocessed cottonseed oil contains a toxic compound called gossypol. To eliminate this substance, cottonseed oil undergoes thermal processing at oil-extraction plants. Therefore, before heat treatment, phospholipids are extracted from the oil and subsequently reintroduced after processing to restore its nutritional quality.

One of the essential components of the daily diet is vitamins. These are low-molecular-weight organic compounds that possess high biological activity even in very small quantities. In the human body, some vitamins can be synthesized endogenously; however, whether the synthesis of vitamins D, K, and B_{12} is sufficient to fully meet the body's physiological requirements remains a subject of scientific investigation. The major portion of these vitamins is obtained exogenously, through food intake.

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The quantity and nature of vitamins present in food products vary significantly. For instance, fat-soluble vitamin A is available in its active form in milk, dairy products, eggs, butter, and liver. To satisfy the body's need for vitamin A (approximately 1000 mg), provitamin A (carotene) — a water-soluble precursor — plays a crucial role. Carotene is abundant in carrots, bell peppers, and pumpkin, and it is converted into vitamin A in the intestines and liver.

Vitamin D is synthesized in the epidermal layer of the skin from 7-dehydrocholesterol under the influence of ultraviolet radiation. Under normal conditions, this endogenous synthesis is sufficient to regulate phosphorus and calcium metabolism in the body. However, in growing children or in conditions of limited sunlight exposure, the amount of vitamin D synthesized may be inadequate. Therefore, in such cases, additional dietary intake of vitamin D is necessary.

Foods rich in vitamin D include fish oil, eggs, milk, and dairy products. The recommended daily intake varies according to age and physiological condition:

- For children under 3 years – 400 IU (International Units) or 0.25 μg,
- For adults – 100 IU,
- For pregnant and lactating women – 500 IU.

Vitamin E belongs to the group of **fat-soluble vitamins**, and the recommended daily intake for an average adult is **12–15 mg**. Foods rich in vitamin E include **vegetable oils, leafy greens, fruits, cereal products, and eggs.** This vitamin plays an important role as a **biological antioxidant,** protecting cell membranes from oxidative damage and supporting reproductive and muscular functions**.**

Biotin (Vitamin H) deficiency may lead to **seborrheic dermatitis** characterized by scaling of the skin. The **daily requirement** for biotin ranges from **0.15 to 0.3 mg.** Biotin is widely distributed in almost all food products, which generally ensures sufficient intake under normal dietary conditions.

Folic acid (Vitamin B_9) deficiency can result in **anemia**, and according to recent scientific studies, it also plays a preventive role in **cardiovascular diseases,** including **atherosclerosis** and **ischemic heart disease.** Foods that are particularly rich in folic acid include **yeast, liver, green vegetables, meat, and meat products.**

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Vitamin B_{12} (Cyanocobalamin) deficiency leads to **pernicious anemia,** a serious hematological disorder resulting from impaired red blood cell formation. The main dietary sources of vitamin B_{12} are **liver, kidneys, meat, fish, and eggs.**
Food poisoning most often occurs in an acute form, and in some cases may develop as a chronic condition, resulting from the consumption of food products of poor sanitary quality. Such foods may contain certain types of microorganisms, their toxins, or other chemically harmful substances.
Food poisoning is often observed in group dining settings, although isolated cases can also occur. Upon detection of food poisoning, the physician must immediately provide first aid to the affected individual. Subsequently, the physician evaluates the causes and circumstances of the poisoning and removes the suspected food products from consumption.
The physician must also promptly notify the District Sanitary and Epidemiological Office (SEO) and the Public Health Department (JSQ). The urgent notification should include the name and address of the affected locality, the date and time of the incident, the name of the suspected food product, and the number of affected individuals.
Additionally, the physician records information on children under 14 years of age, the number of hospitalized patients, the severity of the illness, and any fatal outcomes. The physician signs and dates the report with their full name and signature.
Following this, the physician collects and sends the following samples to the SEO and JSQ laboratories for analysis: samples of the suspected food products, vomitus from the affected individuals, gastric lavage fluids if applicable, and blood and fecal samples from the patients. These samples are analyzed to identify the etiological agent and determine the source of contamination.

Conclusion:
Proper nutrition is one of the most important physiological factors determining human health, work efficiency, and longevity. A balanced and adequate diet ensures normal development of the body, proper metabolic processes, and a strong immune system. Research shows that when energy and nutrients are

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consumed in sufficient and balanced amounts, the body functions optimally; otherwise, deficiencies can lead to various dietary-related diseases.

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