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# Nutritional Correction of Diets as a Means of Influencing the Clinical Course of Pulmonary Tuberculosis

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The study of eating behavior and the impact of food on the course of pathological changes allows not only to identify certain patterns and mechanisms of nutrient therapy but also to scientifically justify methods for preventing morbid conditions caused by nutritional status disorders under the influence of biological factors, particularly tuberculosis infection. Tuberculosis (TB) remains one of the most relevant medical and social issues in Ukraine and is the second leading cause of death from a single infectious agent worldwide. Active hostilities, emergencies and the temporary occupation of certain territories have adversely impacted the population's access to medical services and contributed to the increase in incidence of TB and other socially dangerous infectious diseases. Additionally, it is determined by the following factors: deterioration of living conditions, poor nutrition, lack of access to competent medical services, and the presence of a large number of people with the increased risk of developing TB. Malnutrition precedes the onset of TB; thus, proper nourishment and energy intake affect the body's resistance to infection and, in cases of illness, influence the clinical course. In 2023, the incidence of active TB in Ukraine increased by 7.3 % compared to 2022 (from 45.1 to 48.4 per 100,000 population). The highest frequency rates of TB were observed in the Dnipropetrovsk (86.1 per 100,000), Kirovohrad (92.1), and Odesa (99.6) regions. There was also a significant increase in the incidence rate in Kharkiv, Mykolaiv, Volyn, and Khmelnytskyi regions, as well as in the city of Kyiv.

According to the «Tuberculosis» medical care standard, outlined in the Ministry of Health of Ukraine's Order N 102 from January 19, 2023, the basic principle of TB treatment is antibacterial therapy. However, its efficiency is negatively affected by a range of factors, including disruption of all types of metabolism, which plays a significant role and is directly influenced by the pathological process. Patient nutrition is organized in accordance with the standards specified in the Cabinet of Ministers of Ukraine Resolution N 571 from May 17, 2024, «On the approval of nutrition

standards in regional phthiopulmonology centers, rehabilitation, palliative, and hospice departments providing inpatient medical services to the individuals with tuberculosis». Nutritional diet correction will have a beneficial impact on the clinical course of the disease and contribute to improving the effectiveness of the treatment and the social rehabilitation of patients with pulmonary tuberculosis.

**Objective** – to evaluate the effectiveness of incorporating nutritional correction of diets into the comprehensive treatment of patients with pulmonary tuberculosis in order to influence the clinical course of the disease.

**Materials and methods.** To achieve our objective, the following research methods were used: bibliographic, epidemiological, observational, laboratory, radiological, microbiological, physicochemical, chromatographic, biochemical, and statistical methods. A clinical examination and assessment of protein metabolism were conducted in 102 patients newly diagnosed with pulmonary tuberculosis. A control group of 30 healthy individuals aged from 18 to 55 years was examined, including 16 men (53.0 %) and 14 women (47.0 %).

**Results.** Among the examined patients, the majority were socially disadvantaged, working-age individuals (81.3 % of all patients) who were unemployed at the time of disease onset. Infiltrative and disseminated processes predominated in the lungs, with cavitary lesions observed in 66.7 % of patients and bacterial shedding in 68.6 %. A gradual onset of the disease was reported by 66.7 % of patients, subfebrile body temperature was observed in 47.0 %, moderate coughing in 51.0 %, and weight loss of up to 10 kg in 52.0 % of individuals. The assessment of protein metabolism (PM) parameters showed that prior to the treatment, patients had significant changes in the amino acid composition of blood serum: a statistically significant increase in ammonia levels compared to healthy individuals (up to  $1.9 \pm 0.1$  mg per 100 ml of blood serum) and a decrease in the total amount of amino acids to  $(22.8 \pm 0.6)$  mg per 100 ml of blood serum ( $p < 0.05$ ), primarily due to a reduction in both essential amino acids (lysine, histidine, methionine, arginine, phenylalanine) and non-essential amino acids (glutamic acid, glutamine).

During the treatment, it was found that antimycobacterial therapy had a certain positive effect on some PM indicators, but it was insufficient for the full normalization of metabolic processes (i. e., reaching the levels of healthy individuals), specifically in terms of the complete restoration of the amino acid composition of blood serum. Therefore, without targeted correction of these disorders, rapid and full recovery, as well as sustainable social rehabilitation, cannot be achieved. Thus, we suggested a differential approach to formulating the dietary regimen of patients, taking into account the stage of tuberculosis development and the overall condition of the body.

The diet of the patients was enriched with food products that were accessible to all social groups, of high quality, and matched to each stage of pathogenesis (reducing inflammation, normalizing metabolic disturbances caused by inflammation and prolonged chemotherapy, resolving inflammation and activating reparative mechanisms, correcting psycho-emotional status). For the nutritional correction of immunopathological and metabolic processes, biologically active substances were identified, and a group of food products with the highest content of these substances was recommended.

**Conclusions.** The combination of nutritional correction of diet with antimycobacterial therapy resulted in a significant positive impact on the clinical course of the disease (intoxication syndrome resolved ( $10.8 \pm 0.97$ ) days faster, and respiratory symptoms improved ( $8.95 \pm 1.68$ ) days earlier, with a 33.97 % increase in the healing rate of cavitary lesions by the end of the treatment and a reduction in the average treatment duration by ( $21.1 \pm 2.9$ ) days). It also led to the normalization of protein metabolism indicators, specifically the amino acid composition of blood serum and ammonia levels, which contributed to improving the effectiveness of the treatment and higher levels of social rehabilitation for patients with pulmonary tuberculosis.