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THE ROLE OF PHYSICAL ACTIVITY IN THE PREVENTION OF TYPE 2 DIABETES MELLITUS

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Abstract. Type 2 diabetes mellitus (T2DM) is a chronic progressive disease associated with impaired carbohydrate metabolism, leading to serious complications. The aim of this article is to analyze the role of physical activity in the prevention of T2DM and its complications. Data from surveys and laboratory studies involving 160 patients with T2DM are presented. The study emphasizes the importance of early diagnosis of risk factors, physical activity, and lifestyle modification for improving the quality of life of patients.

Keywords: type 2 diabetes mellitus, physical activity, glycated hemoglobin, glucose, prevention

Introduction. Type 2 diabetes mellitus (T2DM) is characterized as a heterogeneous disease that develops as a result of a combination of genetic and acquired factors. The predisposition to T2DM is based on an individual's genome, which may contain gene alleles that can trigger the disease under the influence

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of environmental factors [1]. T2DM represents a serious chronic progressive condition characterized by elevated serum glucose levels (hyperglycemia) and various comorbidities such as vision impairment, poor wound healing, erectile dysfunction, renal failure, cardiovascular diseases, etc. [1-12].

According to the World Health Organization, no country in the world has sufficient financial resources to fully meet the increasing demands of national healthcare. In this context, the rational use and optimization of limited budgetary funds is a priority task for the organization of diabetes care for the population [2].

Physical activity plays a key role in the prevention of T2DM. Regular exercise improves carbohydrate and lipid metabolism, reduces insulin resistance, and prevents the development of complications [3].

Objective of the study. To investigate the impact of physical activity on the prevention of complications associated with type 2 diabetes mellitus and to optimize glycemic control.

Materials and Methods. The study was conducted at the Republican Specialized Scientific-Practical Medical Center for Endocrinology named after Academician Y. H. Turakulov. The participants included 160 patients with T2DM aged between 18 and 90 years.

Examinations included:

1. Questionnaire: Assessment of lifestyle, physical activity, habits, and adherence to medical recommendations.

2. Clinical and Laboratory Investigations: Measurement of glucose levels, HbA1c, lipid profiles, and associated markers.

3. Analysis: Standard statistical methods were employed for data processing.

Main Body.

Type 2 diabetes mellitus (T2DM) is characterized by elevated blood glucose levels determined by multiple factors. These include the level of physical activity, dietary habits, circadian rhythms, and psychosocial status. These factors influence both the amount of glucose entering the bloodstream and its metabolism [4].

Risk Factors and Prediabetes. Prediabetes, impaired glucose tolerance, and other carbohydrate metabolism disorders represent independent risk factors for the development of cardiovascular diseases. Early detection of such conditions allows for the prevention of diabetes and its complications, including cardiovascular damage [5].

Comorbidities. An analysis of medical records indicated that most patients with T2DM have comorbid conditions such as:

• Diabetic encephalopathy (DE): observed in 67% of patients.

• Diabetic polyneuropathy (DP): diagnosed in 40% of patients.

• Diabetic retinopathy (DR): identified in 35%.

The data are presented in Figure 1, which illustrates the prevalence of comorbidities among patients with T2DM.

Glycated hemoglobin (HbA1c) is a compound formed from the non-enzymatic reaction of glucose with hemoglobin A present in erythrocytes. The rate and extent of this reaction depend on the average blood glucose levels throughout

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the lifespan of the erythrocyte. HbA1c reflects the glycemia that has occurred during the lifespan of erythrocytes, which is approximately 120 days. Since erythrocytes circulating in the blood vary in age, the average glucose level is typically assessed based on the half-life of erythrocytes, which is about 60 days. Consequently, it is recommended that patients with type 2 diabetes undergo HbA1c testing quarterly to monitor diabetes therapy and 4–6 weeks after any changes in treatment strategy.

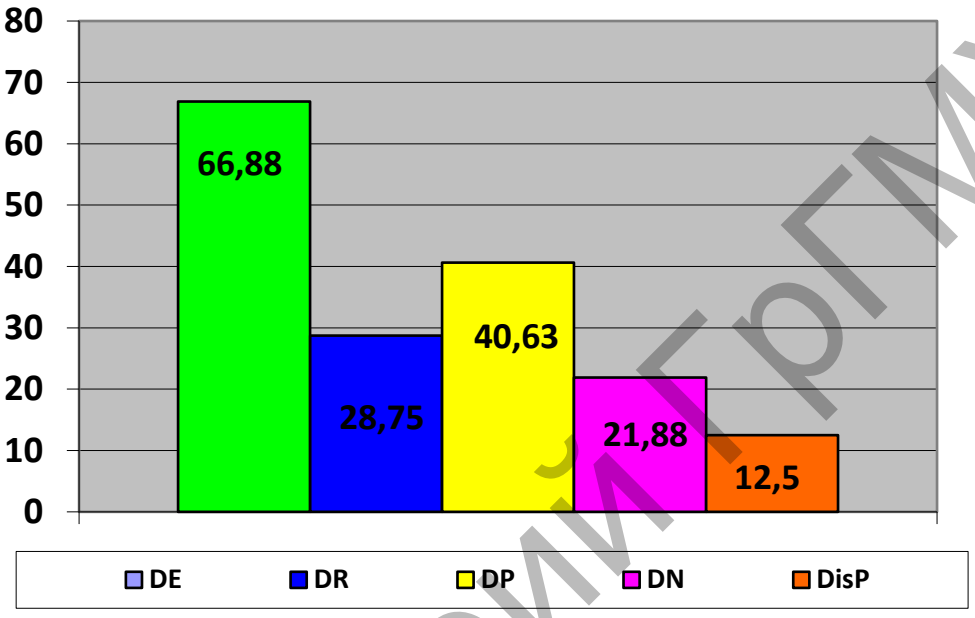

Figure 1 – Prevalence of Comorbidities in Patients with Type 2 Diabetes Mellitus

It is important to note that both aerobic and resistance training offer significant advantages over a sedentary lifestyle, allowing patients with this condition to choose the most suitable form of exercise for themselves and, thus, maintain the results achieved through lifestyle modifications over a long period [7, 8, 9].

According to nutritionists, excess body weight and obesity are the most powerful factors contributing to the onset and progression of diabetes and its complications. Patients with type 2 diabetes require continuous glycemic monitoring of blood glucose levels; however, an analysis of survey data revealed that one-third of patients did not monitor their blood glucose levels, while a quarter of patients checked their blood sugar only once a month.

Research has shown that an unhealthy lifestyle can lead to type 2 diabetes. Additionally, harmful habits (such as smoking, excessive alcohol consumption, and the use of psychoactive substances), unbalanced diets (characterized by a predominance of fatty and sugary foods and beverages, as well as fast food), stress, lack of adequate sleep and rest, a sedentary «office» lifestyle, and an elevated body mass index (BMI) exacerbate the condition [10].

It should be emphasized that daily physical exercise is essential for patients of all ages. Exercise promotes increased glucose uptake by muscles, enhances peripheral tissue sensitivity to insulin, and reduces organ hypoxia [11].

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Figure 2 presents information regarding the level of physical activity among patients with type 2 diabetes.

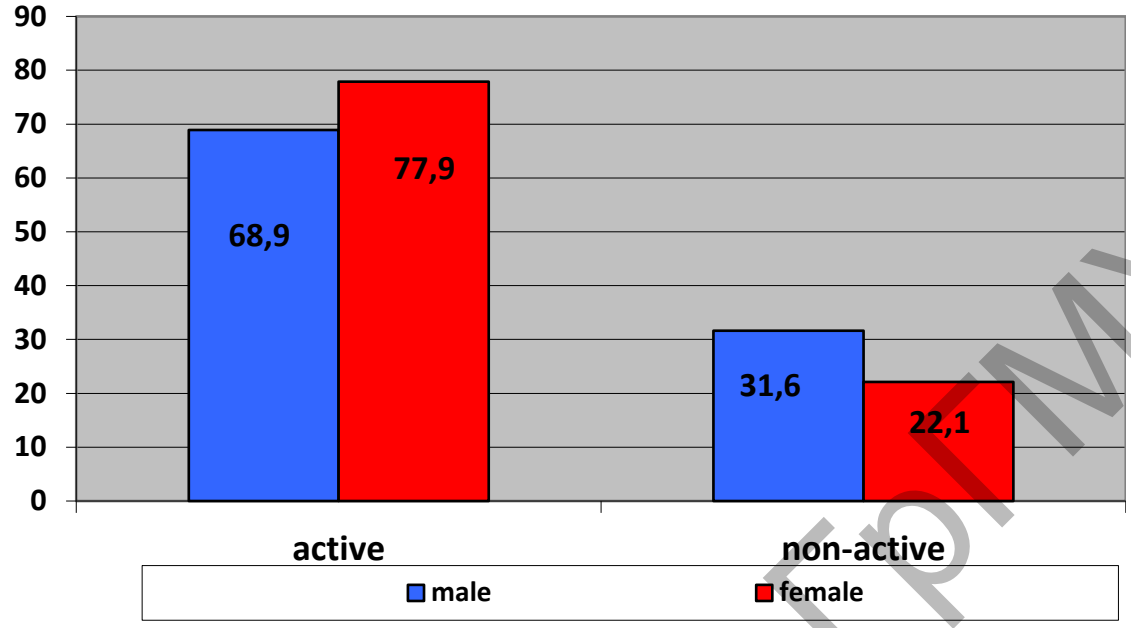

Figure 2 – Physical Activity of Patients with Type 2 Diabetes Mellitus

Type 2 diabetes often remains undiagnosed for extended periods due to the absence of noticeable symptoms. Patients may present with nonspecific complaints such as weakness, rapid fatigue, and memory decline. Chronic hyperglycemia in type 2 diabetes may manifest as: thirst (up to 3–5 liters per day); pruritus; polyuria; nocturia; weight loss; furunculosis; fungal infections; and poor wound healing. Various manifestations of leg pain or erectile dysfunction may prompt the patient's first visit to a physician.

The management of type 2 diabetes requires adherence to a multifactorial strategy that not only ensures adequate control of carbohydrate metabolism but also aims to achieve target levels for blood pressure and lipid metabolism. It is essential to utilize medications that reduce cardiovascular risk and to implement lifestyle modifications (including increased physical activity, weight loss if necessary, smoking cessation, etc.).

Multifactorial interventions can not only significantly reduce the risk of micro-vascular complications and cardiovascular risks but may also lead to a significant decrease in mortality among patients with type 2 diabetes mellitus (T2DM) [12]. Data on the prevalence of smoking among patients is presented in Figure 3.

Obesity is known to be a condition that manifests as a chronic inflammatory disease, primarily associated with damage to the cardiovascular system, T2DM, and non-alcoholic fatty liver disease. The most common causes of obesity include eating behavior disorders (overeating), genetic predisposition, a sedentary lifestyle (hypodynamia), endocrine system disorders, and environmental factors.

It should be noted that metabolic disorders often lead to complications of diabetes, such as microvascular damage to the eyes (retinopathy), kidneys

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(nephropathy), neuropathy, neuroosteoarthropathy, diabetic foot syndrome, macroangiopathies in the form of ischemic heart disease (IHD), chronic heart failure, cerebrovascular diseases, chronic obliterative disease of the lower limb arteries, dyslipidemia (abnormal lipid ratios in the blood), and arterial hypertension.

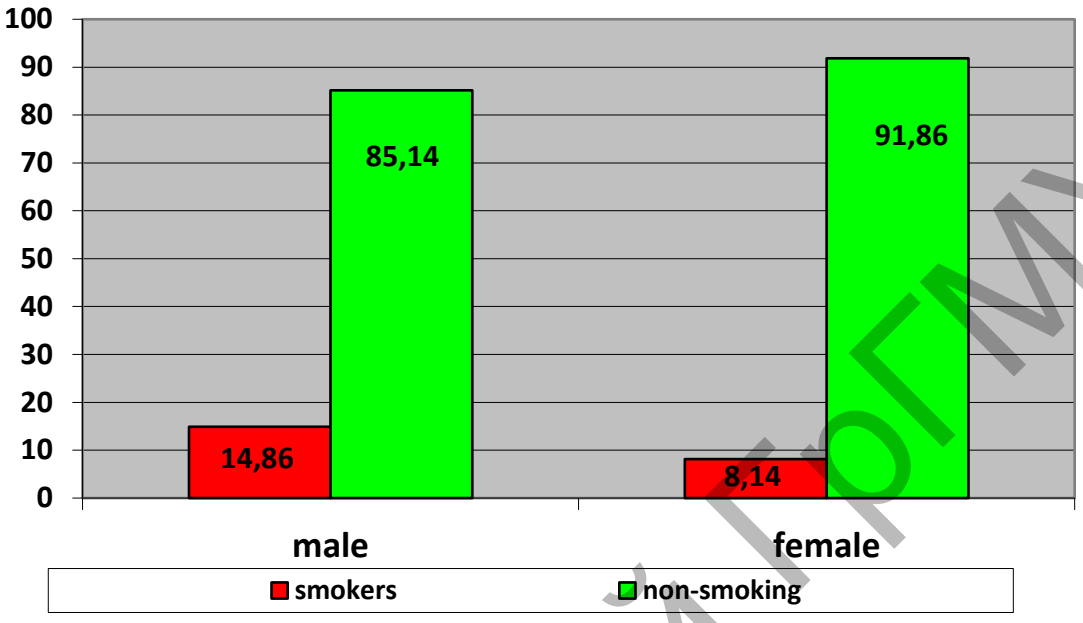

Figure 3 – Presence of the Harmful Factor of Smoking Among Patients with Type 2 Diabetes Mellitus

Appropriate treatment strategies and timely diagnosis of risk factors for T2DM can prevent complications of the disease, especially among adults who have comorbidities and low physical activity.

Conclusion. The results of the study emphasize the importance of physical activity in the prevention of complications associated with type 2 diabetes mellitus. Regular exercise contributes to improved glycemic control, reduced risk of cardiovascular diseases, and enhanced quality of life for patients. However, these observations are not unequivocal and require further investigation.

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ИССЛЕДОВАНИЕ АКТУАЛЬНОСТИ ПРИМЕНЕНИЯ САМОМАССАЖА ПОСЛЕ ЗАНЯТИЙ ФИЗИЧЕСКОЙ КУЛЬТУРОЙ

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EXAMINATION OF THE RELEVANCE OF SELF-MASSAGE AFTER PHYSICAL EDUCATION CLASSES

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Аннотация. В данной работе представлены материалы научно-теоретического исследования потенциального применения студентами самомассажа после посещения занятий физической культурой. В статье установлено, что методы самомассажа не являются популярными в студенческой среде

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