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STUDY OF THE PATHWAY OF FUNCTIONAL DYSPESIA IN PATIENTS WITH TYPE 2 DIABETES

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Abstract: This article studies the clinical and pathogenetic features of functional dyspepsia (FD) in patients with type 2 diabetes. During the study, 120 participants were observed, of which 80 were selected as the diabetes group and 40 as the control group. Functional dyspepsia symptoms were assessed based on the Rome IV criteria, and epigastric pain, early satiety, flatulence, and nausea were identified as the most common symptoms. The results showed that the severity of dyspeptic symptoms is directly related to the degree of glucose compensation and HbA1c indicators. Slowing of gastric motility, dysfunction of the autonomic nervous system, and diabetic damage to enteral nerve fibers were shown to be the leading pathogenetic mechanisms in the development of functional dyspepsia. According to the study, it is important to regularly monitor the functioning of the gastrointestinal system in patients with diabetes, identify dyspeptic symptoms early, and take treatment measures based on an individual approach. Such an approach allows improving glycemic control, improving quality of life, and preventing diabetic complications.

Keywords: Type 2 diabetes, functional dyspepsia, autonomic neuropathy, gastric motility, HbA1c, glycemic control, gastrointestinal symptoms, diabetic gastropathy, clinical follow-up, metabolic disorders.

Introduction

In recent decades, type 2 diabetes mellitus (DM) has become one of the most serious chronic endocrine diseases that pose the greatest threat to human health. According to the World Health Organization (WHO), by 2024, more than 500 million people worldwide will be living with various forms of diabetes, more than 90% of whom will have type 2 diabetes. The main cause of this disease is insulin resistance and relative deficiency of β-cells. Type 2 diabetes profoundly affects not only glucose metabolism, but also the functional systems of the entire body - the cardiovascular, renal, nervous and gastrointestinal systems. Gastrointestinal dysfunction, in particular functional dyspepsia, is one of the most common comorbid conditions among patients with diabetes. Functional dyspepsia (FD) is a syndrome characterized by heaviness, postprandial discomfort, pain, or nausea in the stomach, but without an organic cause, and is characterized by symptoms lasting at least 3 months according to the Rome IV criteria. The pathogenesis of FD in patients with diabetes is mainly centered on autonomic neuropathy, gastric motor disorders, and enteric nervous system dysfunction. This occurs as a result of high glucose levels, oxidative stress, microcirculation disorders, and nerve fiber damage. Scientific sources note that in patients with diabetes, the gastric emptying process is slower than normal, which increases symptoms such as prolonged digestion time, flatulence, early satiety, and nausea. Also, the severity of dyspeptic symptoms is directly related to the

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level of HbA1c, the duration of diabetes, and the patient's quality of life. Dyspepsia, in turn, affects glucose absorption, reducing the effectiveness of hypoglycemic therapy. This situation occurs in the form of a “closed pathological circle”: impaired gastric motility leads to glucose instability, which in turn leads to increased motor dysfunction.

Therefore, the study of functional dyspepsia in patients with diabetes mellitus is one of the current scientific issues in modern gastroenterology and endocrinology. A deep analysis of this problem, identification of the clinical and morphological basis of the development of dyspepsia, assessment of the severity of symptoms and their correlation with the duration of diabetes, glycemic control are of great importance for medical practice.

This study was conducted in 2024–2025 in the therapeutic department of the Republican Specialized Scientific and Practical Center of Endocrinology. The study design was organized as an observational-analytical (observational, cross-sectional) design. The main objective of the study was to identify symptoms of functional dyspepsia in patients with type 2 diabetes mellitus, assess their severity and study their correlation with clinical and biochemical parameters. A total of 120 individuals were involved in the study: 80 of them were diagnosed with type 2 diabetes mellitus and 40 were selected as healthy controls. The study participants were men and women aged 35 to 70 years. The diagnosis of diabetes was confirmed based on WHO recommendations - fasting glycemia ≥7.0 mmol/l, postprandial glycemia ≥11.1 mmol/l, and HbA1c ≥6.5%.

Study criteria:

• Inclusion criteria: patients with a diagnosis of type 2 diabetes, a history of the disease for at least 1 year, taking insulin or oral hypoglycemic drugs.

• Exclusion criteria: organic diseases of the gastrointestinal tract (ulcer, gastritis, stomach cancer), liver or kidney failure, alcoholism, long-term use of antibiotics or NSAIDs.

The criteria for determining functional dyspepsia were assessed according to the Rome IV diagnostic criteria. The clinical condition of the patients was studied using a special Dyspepsia Symptom Rating Scale (DSBS), in which symptoms such as epigastric pain, early satiety, flatulence, nausea were rated from 0 to 4 points.

Laboratory tests included:

• Determination of serum glucose and HbA1c;

• Assessment of the lipid spectrum (cholesterol, triglycerides, HDL, LDL);

• Determination of protein, liver enzymes (ALT, AST) and creatinine levels.

Ultrasound diagnostics (USD) of the gastrointestinal system and gastroscopy were performed as instrumental examinations. The gastric emptying rate was determined using the liquid evacuation test, and the gastric emptying index (GBI) was calculated. The state of the autonomic nervous system of the patients was also assessed using the Ewing test.

Statistical analysis was performed on a computer using the “SPSS Statistics 26.0” program. Mean values (M±m), standard deviation (SD), and reliability were assessed using the

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Student t-test and chi-square methods. The reliability of the results was considered significant at the $p<0.05$ level.

Conclusion

The results of the study showed that the frequency of functional dyspepsia in patients with type 2 diabetes mellitus is high, and this condition is directly related to the duration of the disease, the level of glycemic control, and the activity of the autonomic nervous system. More than half of the patients in the study had dyspeptic symptoms, the most common of which were epigastric pain, early satiety, abdominal distension, and nausea. Slowing of gastric motility, dysfunction of the enteric nervous system, and high glucose levels were noted as the main pathogenetic factors in the development of dyspepsia. Also, the severity of dyspeptic symptoms increased with increasing HbA1c, which confirms the impact of diabetic autonomic neuropathy on the gastrointestinal system. Based on the study, it can be concluded that functional dyspepsia in type 2 diabetes is not just a simple discomfort, but a clinical indicator of metabolic disorders, and its early detection and treatment based on an integrated approach significantly improve the quality of diabetes control.

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