
Prevalence of Cognitive Impairments in Patients with Type 2 Diabetes

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Abstract: The incidence of cognitive impairment in patients with type 2 diabetes mellitus is one of the most common and poorly studied complications of this disease, and therefore, the study of this pathology is relevant today. We studied 117 patients with type 2 diabetes mellitus. A neuropsychological test (MoCA) and an anamnestic survey were conducted to identify the types and severity of cognitive dysfunction. The results showed that in the development of cognitive impairment, risk factors such as the level and variability of glucose in the blood, hypertension, hypercholesterolemia, etc. are of great importance.

Keywords: cognitive dysfunction, type 2 diabetes mellitus, risk factor.

Relevance. Diabetes mellitus (DM) remains one of the most significant pathologies with a high prevalence. In the last decade, it has been proven that diabetes causes disturbances in the functioning of regulatory systems and the psycho-emotional state, and has both a direct and indirect effect on the development of complications from the central nervous system (CNS), manifested by morphological and functional changes [2,4].

Currently, researchers have begun to more closely study damage not only to the peripheral nervous system, but also to the central nervous system, the disruption of which leads to development of cognitive dysfunctions. Considering the greatest prevalence of type 2 diabetes in older patients can be suggest a significant contribution of this factor in the development of cognitive violations. Cognitive dysfunction often causes a decrease in the quality of life and glycemic control, a decrease in adherence to treatment and self-control in patients with type 2 diabetes.

To prevent cognitive impairment, it is necessary to identify and prevent their occurrence as early as possible, at preclinical stages [3].

Existing methods for assessing cognitive impairment (subjective neuropsychological testing), predisposition to them (genetic factors) do not fully meet the needs modern medicine.

Clinical guidelines do not include indications for MRI of the brain, as well as MR spectroscopy, in order to identify hemodynamic and/or metabolic changes characteristic of people with cognitive impairment in the early stages or a predisposition to them in people with type 2 diabetes, taking into account risk factors [3].

Purpose of scientific research is to study the incidence and types of cognitive impairment in patients with type 2 diabetes and determine the role of various risk factors in the development of cognitive dysfunction.

Materials and methods. The study included 117 patients diagnosed with type 2 diabetes with varying degrees of cognitive impairment. The diagnosis of type 2 diabetes was verified in accordance with the standards [Dedov I.I., Shestakova M.V., 2019; Dedov I.I., Shestakova M.V., Mayorov A.Yu., 2017]. Among the subjects studied, men made up 52.1% (n=61), and women 47.9% (n=56). The average age of the patients was 54 ± 2.5 years.

The control group consisted of 50 people, including 20 healthy individuals without diabetes and cognitive impairment, matched by gender and age, and 30 patients with chronic cerebral ischemia with moderate cognitive impairment without disorders of carbohydrate metabolism, matched by gender and age.

Anamnesis was collected from all patients, complaints, histories of the development of the disease on outpatient basis were analyzed cards and extracts from medical histories, a general examination was carried out, verification of diagnosis and complications. To determine cognitive dysfunction, we used the Montreal Cognitive Dysfunction Scale (MoCA test), which allows us to determine the presence of cognitive impairment and makes it possible to assess visual constructive skills, memory, attention, speech, abstraction and orientation.

Statistical analysis and data processing were carried out with using SPSS Statistica software on operating rooms Windows 7/XP Pro systems.

Analysis of results.

At the first stage of the study, patients with type 2 diabetes were divided into three groups based on neuropsychological testing MOCA. The first group with moderate, the second group with mild cognitive impairment (2). At the same time, patients with complaints of decreased memory, speed of reactions to questions, decreased cognitive abilities compared to the patient's premorbid state, which does not cause difficulties in everyday activities and without deviations in neuropsychological testing (MOCA - more than 26 points) included to the group with mild cognitive impairment.

Group with moderates cognitive impairment included patients with a combination of complaints such as the patient himself and his relatives, as well as reduced indicators of neuropsychological tests (MOCA - less than 26 points), memory deterioration not only compared to the premorbid state, but and compared with average age indicators.

Cognitive disorders in patients with type 2 diabetes manifested themselves impaired concentration, forgetfulness of names and objects, and also a decrease in intellectual flexibility. When statistically processing the data obtained, it was revealed that patients with mild cognitive impairment had higher levels of fasting blood glucose and cholesterol and glycohemoglobin than patients with mild dysfunctions.

Based on the study of the patients' anamnesis, the significance of risk factors for the development of cognitive impairment in patients with type 2 diabetes was assessed and a comparative analysis was carried out between the groups. According to the results of a neuropsychological test, 41.1% of patients were diagnosed with a moderate degree of cognitive dysfunction, and 59.9% of patients with mild cognitive impairment.

In order to determine the distribution of risk factors for the development of cognitive impairment in patients with type 2 diabetes by degree of significance, a regression analysis was carried out, as a result of which it was shown that exogenous risk factors (level of glycated hemoglobin, patient age, blood glucose and cholesterol levels, as well as variability glycemia, disease duration, high body mass index.

The results of the study proved that cognitive dysfunction was often detected in patients with type 2 diabetes with complications of atherosclerosis, arterial hypertension, hypercholesterolemia, overweight (history of obesity), glycemic variability and age.

When analyzing anamnestic data in a group with moderate Cognitive impairment was more common in the history of episodes of severe hypoglycemia (61.4%, n=29) and overweight (58.8%; n=28), arterial hypertension (57.8%, n=27). A higher percentage of subjects with mild cognitive impairment had arterial hypertension (92.5%, n=64), hypercholesterolemia (79.6%, n=55), obesity (42.4%, n=29). In this group, insulin therapy was encountered in the majority of individuals, and insulin therapy was also more often initiated (67.5%, n=57) (Table 1).

Another important risk factor is age, and it has been noted that the severity of cognitive impairment increases with age.

Table1.

Comparative assessment of the importance of risk factors for the development of cognitive impairment in patients with type 2 diabetes mellitus (%).

Risk factors	group1 n=48	Group 2 n=69	P
Cases of hypoglycemia	61,4	58,5	0,05
Arterial hypertension	57,8	92,5	0,01
Hypercholesterolemia	46,4	79,6	0,01
Obesity and overweight	58,8	42,4	0,05
Age (over 50)	37,6	62,4	0,05
Duration of diabetes 5 years<	40,3	66,7	0,01

Thus, the main risk factors for the development of cognitive impairment in patients with type 2 diabetes are glycemic variability: high levels of fasting glycemia and glycated hemoglobin blood cholesterol, duration of the disease, glycemic lability and high body mass index. Based on the results, an algorithm for early diagnosis of cognitive impairment in patients with type 2 diabetes and the likelihood of their development was developed. The developed diagnostic algorithm and method for predicting the early development of cognitive impairment in patients with type 2 diabetes allows us to identify a high-risk group for this complication for their timely prevention and treatment.

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