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Evaluation of the prevalence of carbohydrate metabolism disorders and type 2 diabetes mellitus based on the filling of the Diaxatar questionnaire

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Relevance of the topic: the spread of type 2 diabetes mellitus (DM2) around the world has reached the level of an epidemic and continues to grow steadily. According to experts from the International Diabetes Federation (IDF), 79 million adults between the ages of 537 and 20 suffer from diabetes around the world (10.5% of all adults in this age group) and their number is growing. On the other hand, 541 million people suffer from disorders of carbohydrate metabolism. It is estimated that people aged 643 million by 2030 and 783 million aged 20 to 79 years by 2045 will be living with diabetes [1].

Purpose: to identify high-risk groups for the development of carbohydrate metabolism disorders and type 2 diabetes mellitus on the basis of filling out a Diaxatar questionnaire among the population living in Marhamat District of Andijan region.

Materials and methods: 18 residents over the age of 2112 living in the Marhamat District of Andijan region underwent a violation of carbohydrate metabolism and a screening examination of the DM2 type. All participants completed a Diaxatar questionnaire and their blood sugar levels were measured, a glucose tolerance test was performed.

Results obtained: during the study, 2,112 people were examined, of which 1,356 (64.2%) did not disrupt carbohydrate metabolism. Different levels of carbohydrate metabolism disorder have been found in the remaining 669 (31.6%) people: 87 (4.1%) people were first diagnosed with Type 2 diabetes, 243 (11.5%) people had fasting glycemia disorder (FGD), 267 (12.6%) people had impaired glucose tolerance (IGT), and 159 (7.5%) people had FGD and IGT.

Filling out the Diaxatar questionnaire increases the chances of early detection of DM2-type disorders and carbohydrate metabolism. The survey showed that type 2 diabetes and carbohydrate metabolism disorders increased with an increase in scores.

Conclusion. The active use of the Diaxatar questionnaire makes it possible to identify type 2 diabetes and carbohydrate metabolism disorders among the population at an early stage, prevent complications resulting from the disease, and reduce the risk of death.

Keywords: diabetes mellitus, prediabetes, glucose tolerance, fasting glycemia, Diaxatar, carbohydrate metabolism disorders.

Currently, there is a steady increase in the prevalence of various disorders of carbohydrate metabolism in Uzbekistan, as well as in the whole world [6-7]. In less than 20 years, the number of diabetes patients in the world has increased 6 times. According to the estimates of the International Diabetes Federation (IDF), in 2017 there were 451 million people in the world. people had diabetes, and about 318 million people had prediabetes, and their total costs amounted to 850 billion US dollars [3]. By 2035, 592 mln. a person has diabetes [5]. By 2040, the prevalence of prediabetes is expected to increase to 482 million in line with global obesity trends, with the prevalence of prediabetes in low- and middle-income countries increasing particularly dramatically due to rapid lifestyle changes [4]. Population prevalence of prediabetes has been reported in cohort studies [7–16]), but estimates vary depending on the thresholds used to diagnose prediabetes and baseline population characteristics [17,18]. On December 20, 2006, the United Nations (UN) resolution on diabetes was adopted. This contagious didn't happen chronic disease with depends whole the world across the threat announcement did of the UN the first resolution [19,20].

Disturbance of carbohydrate metabolism is one of the main signs and links in the pathogenesis of metabolic syndrome or "syndrome X", which has received a lot of attention in recent years [21]. The pathogenesis of the metabolic syndrome, which includes obesity, hyperinsulinemia, dyslipidemia, and arterial hypertension, is based on insulin resistance.

In accordance with the increased risk of cardiovascular complications, hyperglycemia is already observed at the pre-diabetic level, and it was established that treatment should be carried out already at the stage of NGB and GTB to prevent the development of QD2-type.

Unfortunately, patients with early disorders of carbohydrate metabolism (NGB, GTB) often lead to the progression of metabolic diseases and transition to QD2 due to lack of medical supervision. In the first year after the diagnosis of GTB, 5-10% of patients with GTB become QD2, in five years - 20-35% of people, and if NGB is combined with GTB, QD2 develops in 38-65% after 5 years [31]. At the same time, early disorders of carbohydrate metabolism are almost never registered, and patients of this group are not put under dispensary control, which means they are not treated in time.

Thus, timely identification of persons at risk and organization of screening among them allows to detect latent type 2 diabetes, as well as to take necessary preventive measures. There are several questionnaires for this purpose, and we developed the DiaXatar questionnaire based on the FINDRISC questionnaire, which is recognized by experts around the world. The DiaXatar questionnaire contains 16 questions about age, body mass index (BMI), waist circumference, hip circumference (BA/SA), physical activity, daily fruit and vegetable consumption, antihypertensive therapy, and history of COVID-19. Each answer is evaluated with a certain number of points, the sum of which corresponds to the risk of type 2 diabetes (the maximum possible score is 26). Assessment of the degree of carbohydrate metabolism disorder was carried out according to the 1999/2006 classification of the World Health

Organization. All participants underwent a physical examination, including height, body weight, (TVI), blood pressure (BP).

Materials and methods: People over 18 years old living in Markhamat district of Andijan region without a history of diabetes were taken for screening. A DiaKhatar questionnaire was collected from each subject. Height, weight, TVI, BA, SA, BA/SA ratios of all subjects were calculated. Each answer in the questionnaire is evaluated with a certain number of points, the sum of which corresponds to the risk of healthy, prediabetes and type 2 diabetes (the maximum possible score is 26). Next, the subjects were measured for fasting capillary blood glucose levels. OGTT was performed in all participants. The OGTT was performed by measuring blood sugar at a meal and 2 hours after a 75g glucose load. Glucometers with standard testing were used to measure blood glucose. Glucose in capillary blood was determined using an automatic Satellit express (Russia) analyzer. Interpretation of the results was done according to WHO, 1999/2006 criteria.

According to it, the diagnosis of postprandial glycemia (NGB) is made when the blood sugar level is 5.6-6.1 mmol/l at lunch, Glucose tolerance disorder (GTL) is diagnosed when the blood sugar level is 7.8-11.1 mmol/l 2 hours after the OGTT. diabetes was diagnosed when the blood sugar level was higher than 11.1 mmol/l.

Determination of biochemical parameters (glucose, cholesterol, lipoproteins) was carried out in the conditions of a biochemical laboratory on an automatic analyzer (biochemical analyzer Mindray A88).

Results and discussion: With the increase in the number of points collected in the process of filling out the questionnaire, it was found that the percentage of people with impaired carbohydrate metabolism increased 0-5, 6-10, 11-15, 16-20, 21 or more. (Table 1)

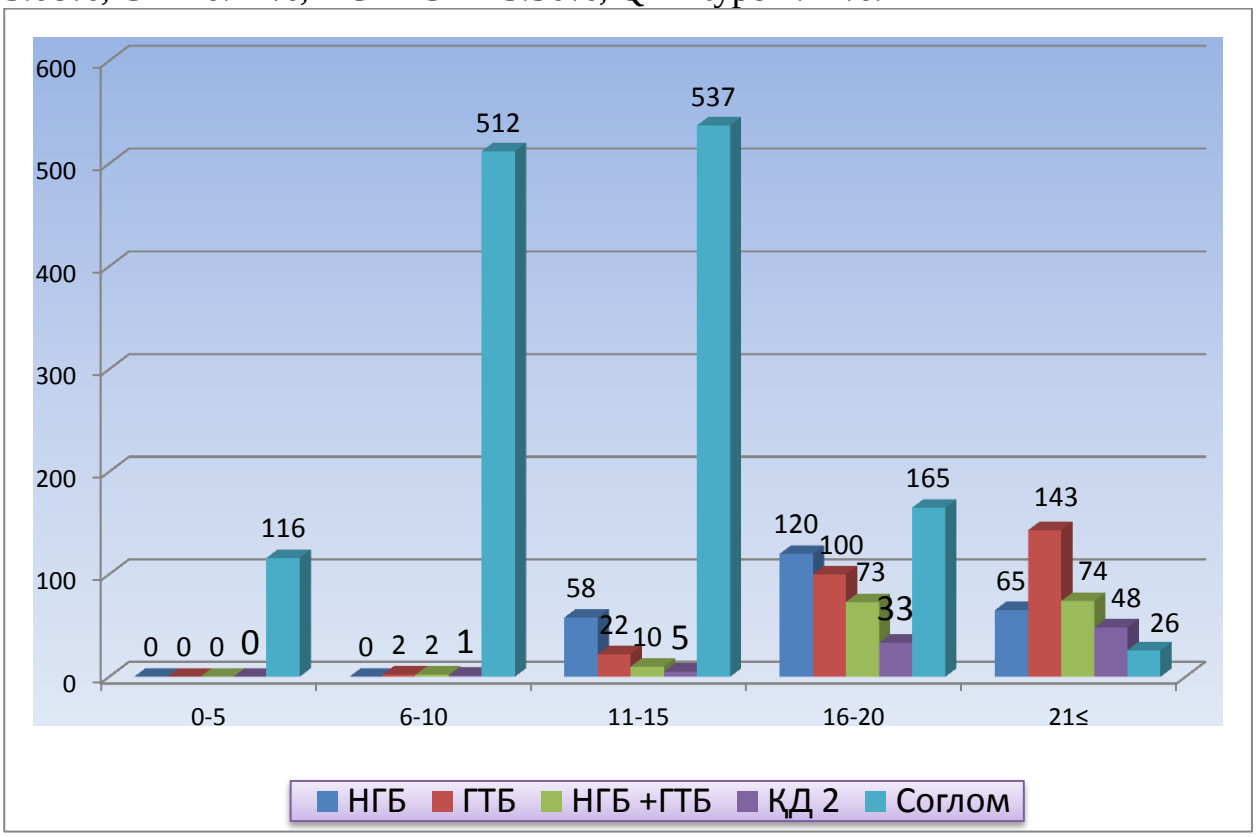
Table 1

Distribution of carbohydrate metabolism disorders, QD2-type and healthy groups by sum of points % (n)

No	Points sum	NGB		GTB		NGB + GTB		QD 2		Healthy		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
1	0-5	0	0.0	0	0.0	0	0.0	0	0.0	116	5.5	116	5.5
2	6-10	0	0.0	2	0.1	2	0.1	1	0.0	512	24.2	517	24.5
3	11-15	58	2.7	22	1.0	10	0.5	5	0.2	537	25.4	632	29.9
4	16-20	120	5.7	100	4.7	73	3.5	33	1.6	165	7.8	491	23.2
5	21≤	65	3.1	143	6.8	74	3.5	48	2.3	26	1.2	356	16.9
	Total	**243**	**11.5**	**267**	**12.6**	**159**	**7.5**	**87**	**4.1**	**1356**	**64.2**	**2112**	100

As a result of our study, UAB and type 2 diabetes were not detected in the group with a score in the range of 0-5. In the range of 6-10 points, various violations of UAB were determined according to GTB 0.09%, NGB+GTB 0.09%, QD2-type 0.05%. These indicators were NGB 2.75%, GTB 1.04%, NGB+GTB 0.47%, QD type

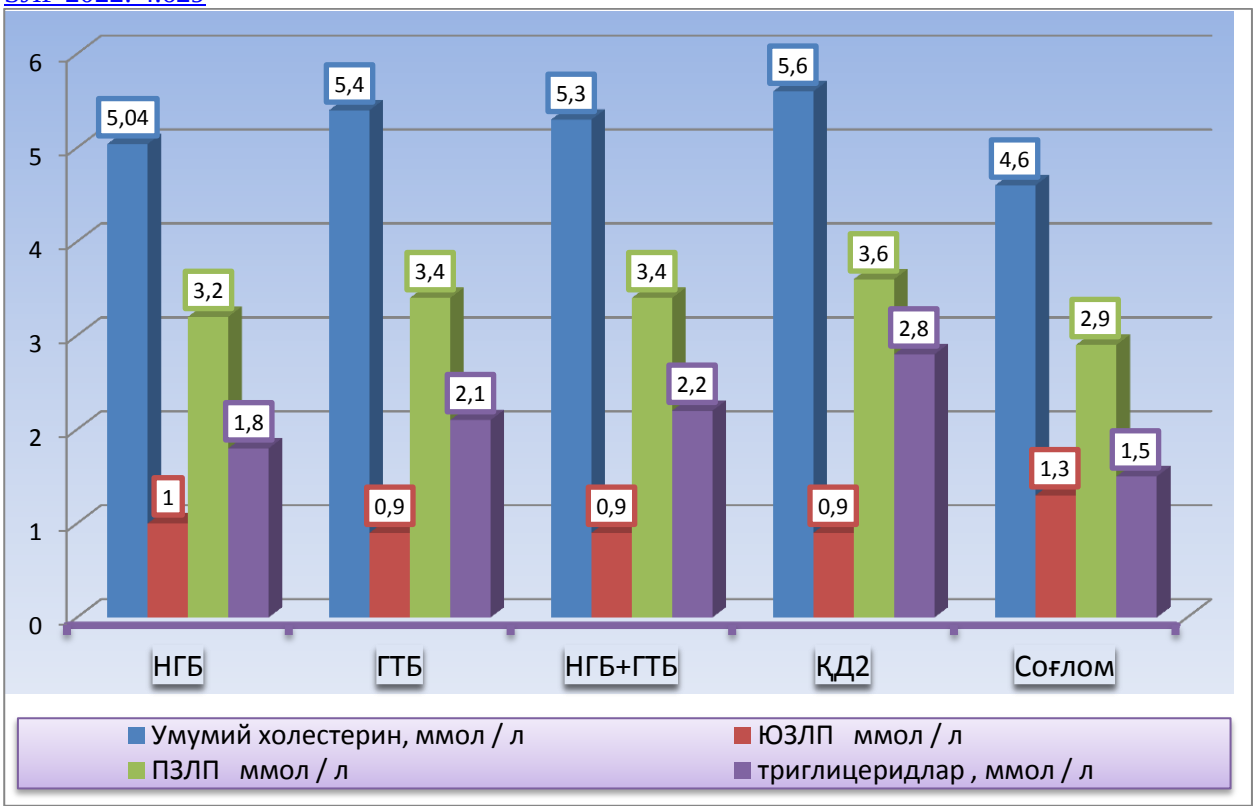
2 0.24% among those who scored in the range of 11-15 points. In the range of 16-20 points, NGB 5.68%, GTB 4.73%, NGB+GTB 3.46%, QD2-type 1.56% were detected. In the group with a score of 20 and above, the rates were highest, NGB 3.08%, GTB 6.77%, NGB+GTB 3.50%, QD2-type 2.27%.



Carbohydrate metabolism disorder, type 2 diabetes and proportion of healthy groups according to the Diakhatar questionnaire.

It can be seen that as the number of points collected on the questionnaire increased, the new identification of different levels of UAB and QD type 2 increased.

People with minimal scores in the questionnaire were relatively young, had relatively low TVI, relatively low BA/SA ratio, and relatively low post- and post-OGTT glycemia. It is known that type 2 diabetes develops atherogenic dyslipidemia, which leads to the development of cardiovascular complications, so it is mandatory to study the lipid profile in this category of patients. According to our data, an increase in the level of total cholesterol, PZL and TG was noted in all groups of patients. In patient groups, high-density lipoproteins were lower than in the control group (healthy). Triglycerides have the greatest prognostic value for cardiovascular complications of type 2 diabetes and prediabetes. In our study, triglycerides were 2 times higher in the groups with type 2 diabetes and impaired glycemic control (NGB) than in the healthy group, and 1.7 times higher in the group with impaired glucose tolerance.



It can be seen that a high score on the DiaXatar questionnaire reflects not only the risk of developing type 2 diabetes, but also the risk of cardiovascular diseases.

Conclusion: For the studied population, the DiaXatar questionnaire is a reliable tool that allows to determine the risk group for the development of diabetes over a 10-year period. With the increase in the number of points collected by filling out the questionnaire, it is possible to identify not only type 2 diabetes and early disorders of carbohydrate metabolism, but also the risk of cardiovascular diseases.

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