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"ASSESSMENT OF HYPOGLYCEMIC CONDITIONS IN PATIENTS WITH TYPE 1 AND TYPE 2 DIABETES MELLITUS USING A QUESTIONNAIRECSP-DM-HYPOGL (COMPREHENSIVE SYMPTOM PROFILE-DIABETES MELLITUS HYPOGLYCEMIA MODULE)"

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Abstract:

Purpose of the study– to study the value of the CSP-DM-HypoGl (Comprehensive Symptom Profile-Diabetes Mellitus Hypoglycemia Module) questionnaire in patients with type 1 and type 2 diabetes mellitus according to negotiability data.

Material and research methods. An analysis was performed on 90 patients with type 1 and type 2 diabetes mellitus receiving intensive insulin therapy and combined glucose-lowering therapy.

Next, the patients were divided into 3 groups:

1 gr. - 30 patients with type 1 diabetes mellitus receiving intensive insulin therapy (IIT),

2 g A -30 patients with type 2 diabetes mellitus receiving intensive insulin therapy,

2 g B - 30 patients with type 2 diabetes mellitus receiving combination therapy (CT).

All patients underwent standard clinical, laboratory and instrumental examination according to patient management algorithms

Research results. It was found that in patients of groups 1 and 2 B, complaints with an intensity of more than 7 points were more common, that is, according to the questionnaire scale, more pronounced, while in patients of group 2 A, complaints were less common. This may indicate that symptomatic hypoglycemia in patients with type 1 diabetes and type 2 diabetes on IIT is more severe than in patients with type 2 diabetes on CT. Moreover, the lowest average values of hypoglycemia were observed in men and women with type 1 diabetes.

It was found that in patients of groups 1 and 2 B, complaints with an intensity of more than 7 points were more common, that is, according to the questionnaire scale, more pronounced, while in patients of group 2 A, complaints were less common.

A decrease in the average scores of the selected symptoms - loss of strength, sweating, muscle spasms, nightmares - prevailed in patients with type 1 diabetes. Based on the studies performed, we developed an algorithm for diagnosing hypoglycemia.

Conclusions:1. For patients with type 1 and type 2 diabetes, in the questionnaire for assessing hypoglycemic states CSP-DM-HypoGl, the most intense complaints on the scale were such complaints as loss of strength, sweating, muscle spasms, nightmares ($p<0.05$). Moreover, the average scores for these symptoms prevailed in patients with type 1 diabetes.

2.To assess the hypoglycemic conditions of patients with type 1 and type 2 diabetes, it is recommended to use the Comprehensive Symptom Profile–Diabetes Mellitus Hypoglycemia Module questionnaire.

Keywords: hypoglycemia, diabetes mellitus type 1 and 2, questionnaire

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RELEVANCE. The issue of hypoglycemic conditions (HHS) has been and remains important and relevant in diabetology, namely, causes, risk factors, frequency, prevention, self-control, etc. All these problems are widely discussed in modern literature, despite being studied. This is explained by the fact that there is still no single standard, international consensus on HS, determining the degree of gradation or severity. [1]

Hypoglycemia(fromOld Greekὑρь - from below, under + ghlkhket - sweet + bĩmb -blood) —a pathological condition characterized by a decrease in the concentration of glucose in the blood plasma below the level of 2.8 mmol/l, occurring with certain clinical symptoms, or less than 2.2 mmol/l, regardless of the presence or absence of clinical signs. A condition in which hypoglycemia is accompanied by loss of consciousness is called hypoglycemic coma.[2]

There are 2 forms of hypoglycemia, differing from each other in the severity of the condition.

1. Mild hypoglycemia - in this condition, the patient, regardless of the severity of clinical symptoms, can correct the hypoglycemic state independently by ingesting carbohydrate foods.
2. Severe hypoglycemia is accompanied by disturbances of consciousness, including loss of consciousness. In this case, the patient needs outside help.[3]

Hypoglycemic conditions are common in type 1 diabetes, including when trying to maintain good glycemic control. In this case, hypoglycemia is often observed, not accompanied by typical clinical symptoms, the so-called. low-symptomatic and asymptomatic hypoglycemia; With a glycemic level below 50 mg/% (2.8 mmol/l), patients remain about 10% of the time during the disease. On average, people with type 1 diabetes experience two symptomatic hypoglycemia per week, thousands of episodes during their lifetime; Every year, in at least 1 case, loss of consciousness occurs and outside assistance is required. It is estimated that 2-4% of deaths in diabetes mellitus are associated with hypoglycemia [4, 5].

According to the DCCT (Diabetes Control and Complications Trial), the main barrier to achieving strict glycemic control is the 3x risk of severe hypoglycemia. In this case, the predictor of the severity of hypoglycemia is the frequency of hypoglycemic conditions and the hypoglycemia misrecognition syndrome (CHS). The syndrome of non-recognition of hypoglycemia is determined by increasing the threshold for the occurrence of autonomic symptoms when inducing hypoglycemia using the hypoglycemic clamp method. The diagnosis of hypoglycemia unawareness syndrome is usually quite subjective, as it is determined when the patient fills out special questionnaires. The emergence and active implementation of the method of continuous subcutaneous glucose monitoring (CSMG) has made it possible to identify and objectively document the syndrome of non-recognition of hypoglycemia. [6]

According to the authors, asymptomatic hypoglycemic conditions were detected by continuous subcutaneous glucose monitoring in 57.5% of examined patients with type 1 diabetes mellitus, with 1-2 episodes - in 42.5%, with 3 or more episodes - in 35 % of patients. A relationship was found between the presence and frequency of asymptomatic hypoglycemic conditions andDAN (diabetic autonomic neuropathies), prolonged QTc interval, duration of the disease, age of patients, as well as the level of glycated hemoglobin. According to the authors, if 3 or more episodes of asymptomatic hypoglycemia are detected in patients using continuous subcutaneous monitoring, in the presence of hypoglycemia non-recognition syndrome, in combination with DAN> 7 points and QTc> 440 ms, this group of patients should be assessed as having a high risk of electrical instability of the myocardium. All this emphasizes the relevance of this study.[7]

Thus, a review of the literature showed the currently discussed range of issues about HH, risk factors and the likelihood of prevention. In addition, the management of HH remains unclear; there are no clinical guidelines on this issue. All this emphasizes the need for further study of this issue, the search for methods of early diagnosis and prevention, as well as an algorithm for identifying HH at the earliest stages.

All of the above emphasizes the relevance of this study..

PURPOSE OF THE STUDY– to study the value of the CSP-DM-HypoGl (Comprehensive Symptom Profile-Diabetes Mellitus Hypoglycemia Module) questionnaire in patients with type 1 and type 2 diabetes mellitus according to negotiability data.

MATERIAL AND RESEARCH METHODS. The characteristics of hypoglycemic conditions were studied in 90 patients with type 1 and type 2 diabetes who applied as inpatients to the RSNPMCE for the underlying disease from 2023–2024, of which 42 were men and 48 women.

Patientswere distributed as follows into the following groups: 1 gr. - 30 patients with type 1 diabetes mellitus receiving intensive insulin therapy, 2 g A - 30 patients with type 2 diabetes mellitus receiving intensive insulin therapy, 2 g B - 30 patients with type 2 diabetes mellitus receiving combination therapy (CT).

All patients underwent a complex of studies, including general clinical (general blood and urine analysis), biochemical (blood glucose, glycemic profile, glucose tolerance test, glycated hemoglobinHbA1C), hormonal (if necessary - insulin, C-peptide in blood serum,

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radioimmunoenzyme method), ultrasound of internal organs and patient questionnaires.

To identify a history of hypoglycemic conditions in patients with type 1 and type 2 diabetes mellitus, the Comprehensive Symptom Profile-Diabetes Mellitus Hypoglycemia Module questionnaire was used. (CSP-DM-HypoGl).

This questionnaire consists of 28 questions, and the patient himself filled out the questionnaire, which states: "Please, in each of the items, mark one number (with an "X") that most closely corresponds to your feelings during the most severe episode of hypoglycemia over the past month. Zero (0) means no symptom at all, ten (10) means the symptom was as severe as imaginable. In accordance with international recommendations, when interpreting the results, it is necessary to take into account the severity of symptoms: 1-4 points - a slightly expressed symptom, 5-6 points - a moderately expressed symptom, 7 or more points - a significantly expressed symptom.

The obtained data were processed using computer programs Microsoft Excel and STATISTICA_6

RESEARCH RESULTS. Table 1 shows the distribution of patients by age and gender by group. The control group consisted of 20 healthy individuals of the appropriate age. Table 1 shows the distribution of patients by age and groups.So, the average age of patients with type 1 diabetes for men and women, respectively, was: 26.2 ± 1.8 / 26 ± 1.6 years, the average age of patients with type 2 diabetes for men and women, respectively: 54.5 ± 1. 5 /61.6± 1.8 years.

Table 1
Distribution of patients by age and groups (according to WHO).

Age, years	1 g (n=thirty)		2 gA (n=thirty)		2 g B (n=thirty)	
	m	and	m	and	m	and
18 – 29	7	4	-	-	-	-
30-44	10	6	3	1	2	-
45-59	-	3	6	3	4	9
60-74	-	-	3	10	4	7
75 and >	-	-	1	3	2	2
Total	17	13	13	17	12	18

Table 2 shows the average values of biochemical parameters by group.

table 2
Average biochemical blood parameters of patients by groups

Group	blood glucose * mmol/l	HbA1C,%	SCF
1 group n= 30	3.3*± 0.7 / 7.8± 1.9	8.2* ± 0.4	82.3*± 3.2
2 A group n= 30	3.6*± 0.3 / 8.2*± 1.6	8.4*± 0.4	64.4* ± 3.2
2 B group n= 30	3.05± 0.2* / 8.9*± 2.1	8.0* ± 0.4	65.1*± 4.0

Note: P - significance of differences compared with control data, where * - p <0.05. *the lowest blood sugar values are indicated. The numerator indicates the average levels of hypoglycemia, and the denominator indicates hyperglycemia

Table 3 shows the results of the questionnaire analysis. For patients with type 1 and type 2 diabetes, in the CSP-DM-HypoGl questionnaire for assessing hypoglycemic states, the most intense complaints on the scale were such complaints as loss of strength, sweating, muscle spasms, nightmares (p<0.05). Moreover, the average scores for these symptoms prevailed in patients with type 1 diabetes.

As can be seen from Table 3, it was revealed that in patients of groups 1 and 2 B, complaints with an intensity of more than 7 points were more common, that is, according to the questionnaire scale, more pronounced, while in patients of group 2 A gr - less

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often. This may indicate that symptomatic hypoglycemia in patients with type 1 diabetes and type 2 diabetes on IIT is more severe than in patients with type 2 diabetes on CT. Moreover, the lowest average values of hypoglycemia were observed in men and women with type 1 diabetes.

It was found that in patients of groups 1 and 2B, complaints with an intensity of more than 7 points were more common, that is, according to the questionnaire scale, more pronounced, while in patients of group 2A, complaints were less common.

This may indicate that symptomatic hypoglycemia in patients with type 1 diabetes and type 2 diabetes on CT is more severe than in patients with type 2 diabetes on IIT. At the same time, the lowest average values of hypoglycemia were observed in men and women with type 2 diabetes mellitus. They were dominated by various complications and concomitant diseases.

Table 3. Questionnaire analysis resultsCSP-DM-HypoGl **by group (average data)**

Complaints	**1 g**		**2 A gr**		**2 B gr**	
	m	**and**	**m**	**and**	**m**	**and**
1. Loss of strength	8.2*	7*	7.8*	5.7	5.4	6.3
2. Dizziness	6.9	6.8	5.6	4.8	4.6	6.5
3. Sweating	7.5*	7.5	4.4	5.4	5	7.5*
4. Chills	7.25*	7.5	3.8	4.4	4.25	7.5*
5. Trembling all over the body	7.1*	6.7	4	4.6	4.4	6.5
6. Feeling hungry	6.5	7.5*	6.8	6.8	7*	7*
7. Heartbeat	6.7	7.5*	6.8	7.8*	4.25	7.5
8. Pale skin	6.3	6	4.2	5.6	2.6	6.3
9. Headache	6.2	6.5	7*	8.2	5.4	6.5
10. Difficulty speaking	4.2	6	3	3.6	2.25	6.6
11. Poor concentration	6.7	6.5	6.8	6.6	4.5	6
12. Impaired coordination of movements	3.9	4	3.8	3.9	1.8	4.5
13. Visual impairment	4.1	7*	5	6.6	3.25	4.5
14. Muscle spasms, cramps	7.8*	6	4.8	7*	4.4	7.5*
15. Dry mouth	4.8	6	5.8	4.6	4.25	6
16. Nausea	4.5	6	3.8	3.4	4.6	6
17. Numbness in the lips	4.1	6.5	2.8	3.8	2.75	6.5
18. Feeling of fear	6.7	7*	4.4	6	5.4	7
19. Feeling anxious	6.5	7.5*	5.4	6.6	7.1	7.5
20. Irritability	8.2*	8*	8*	6	6.3	8
21. Feeling depressed	7.1*	6.5	4.2	5.2	4.4	6.5
22. Confusion	6.4	5.5.	3.6	4.4	3.6	5.5
23. Sweating during night sleep	7.9*	5.5	7*	6.6	4.25	5.5

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24. Muscle spasms, cramps during night sleep	8.0*	8 *	5.4	7.2*	3.9	8
25. Sleep disturbance	7.3*	7.5*	6.4	7. *	3.6	7.5*
26. Nightmares or bad dreams	8.3	7*	6.4	7.8*	5.5	8 *
27. Morning headache	5.4	6.5	5	7*	2.9	6.5
28. Weakness in the morning	7.6*	7*	6.4	7.4*	4.4	7*

Note: In accordance with international recommendations, when interpreting the results, it is necessary to take into account the severity of symptoms: 1-4 points - slightly expressed symptom, 5-6 points - moderately expressed symptom, 7 or more points - significantly expressed symptom. * - significance of differences with control, where * is $p < 0.05$

A decrease in the average scores of the selected symptoms - loss of strength, sweating, muscle spasms, nightmares - prevailed in patients with type 1 diabetes. Based on the studies performed, we developed an algorithm for diagnosing hypoglycemia.

CONCLUSIONS:1. For patients with type 1 and type 2 diabetes, in the questionnaire for assessing hypoglycemic states CSP-DM-HypoGl, the most intense complaints on the scale were such complaints as loss of strength, sweating, muscle spasms, nightmares ($p<0.05$). Moreover, the average scores for these symptoms prevailed in patients with type 1 diabetes.
2.To assess the hypoglycemic conditions of patients with type 1 and type 2 diabetes, it is recommended to use the Comprehensive Symptom Profile–Diabetes Mellitus Hypoglycemia Module questionnaire.

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