

COMORBID PATHOLOGY IN CHILDREN WITH DIABETES MELLITUS TYPE 1 DIABETES

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Abstract. *This article presents the comorbid condition of children with type 1 diabetes mellitus. Early detection of comorbid condition contributes to the timely provision of medical and psychological care, which in turn leads to the reduction of possible disorders associated with the nervous system.*

Keywords: *diabetes complication, diabetes mellitus, children.*

Introduction. Diabetes mellitus (DM) is a chronic metabolic disease that forms due to absolute insulin deficiency in type 1 DM or its relative insufficiency and resistance in type 2 DM. Currently, worldwide, diabetes is recognized as a "non- infectious epidemic". [1,3,9]. The reason for this is its high incidence, and in all age categories, as well as the presence of an increased risk of complications with its subsequent invalidization. This disease is a serious problem, in which there is damage to many organs and systems, the central nervous system is no exception.

The number of pediatric and adolescent patients seeking care for diabetes mellitus is increasing year by year. Therefore, pediatric diabetes has been the most pressing problem of global health care for many years. Expansion of the range of age limits, formation of serious enough complications with possible subsequent disability, in many respects determine its leading positions both in the world and national programs of timely counteraction and assistance to victims [4,5,6,7].

As noted above, one of the "targets" of the negative effect of hyperglycemia, already at the initial stages of the disease, is the central nervous system (CNS). Various pathologies affecting the CNS, due to the peculiarities of innervation among the complications of diabetes in childhood have a certain priority, because of the heterogeneous nature of clinical signs, as well as the problematic nature of diagnostic and especially therapeutic measures. Moreover, cognitive impairments, which are the main brain abnormalities in type 1 DM, negatively affect the achievement and maintenance of optimal glycemic control [4,8,10]. According to literature data, it is evident that the initial manifestations of cognitive dysfunction in this disease can occur already during the first 2-8 years since the disease debut. In this regard, early determination of the quality of life and its subsequent study in the dynamics of the disease will contribute to the timely provision of medical and psychological care, which will naturally affect the reduction of complications of the nervous system in type 1 DM.

In modern studies, authors emphasize the negative impact of chronic somatic pathologies on the optimal activity of cognitive, conceptual, communicative, motivational spheres, and this contributes to personality and behavioral deviations [2,11,12,13,14].

Purpose of the study- Early detection of comorbid conditions contributes to the timely provision of medical and psychological care, which in turn leads to the reduction of possible disorders that are associated with the nervous system.

Materials and methods of research

To solve the set goal 102 ((girls were 46 (45,09 %), boys -56 (54,9 %)) children suffering from diabetes mellitus type 1 with pathology experience from 1 year to 15 years were examined. The studies were conducted in the children's department of the Republican Specialized Scientific and Practical Medical Center of Endocrinology of the Republic of Uzbekistan in 2021-2024. The age of children at the time of clinical data analysis ranged from 7 to 18 years. Clinical studies included assessment of complaints, neurological status.

Results and Discussion: To determine the neurologic changes and quality of life of these children, we formed 3 groups depending on the duration of the disease. I- group with disease history up to 3 years, II-group from 3 to 6 years, and III-group with more than 6 years of DM.

The results of neurologic function assessment with regard to the duration of the disease are presented in Table 1.

Table 1 Distribution of complications of diabetes mellitus depending on the degree of metabolic compensation (abs. number, %).

Complications	Metabolic compensation			P
	Compensation	Subcompensation	Decompensation	
Diabetic retinopathy	3 (75,0)	30 (42,9)	11 (39,3)	0,401
Diabetic nephropathy	0 (0)	5 (7,1)	12 (42,9)	<0,001* Rsubcomp. - decomp. < 0,001
Diabetic polyneuropathy	1 (25,0)	40 (57,1)	14 (50,0)	0,404
Chiropathy	1 (25,0)	24 (34,3)	10 (35,7)	0,915
Hypertrophic lipodystrophies	1 (25)	28 (48,6)	12 (50)	0,673
The phenomenon Of "morning dawn."	0 (0)	10 (14,3)	6 (21,4)	0,309

* - differences of indicators are statistically significant (p <0.05).

Diabetic polyneuropathy was the most frequent complication in the examined groups, with a total frequency of 55 (53.9%) cases. Initial manifestations of nonproliferative retinopathy detected during ophthalmologic examination were most frequently found in children in the subcompensation stage - 30 (42.9%). Diabetic nephropathy significantly prevailed in the group of patients with decompensated diabetes - 12 (42.9%). Objective skin examination of 41 (40.1%) children showed areas of lipodystrophy of hypertrophic type on the abdomen, thighs and shoulders, which, in our opinion, were caused by improper application of insulin therapy. In 16 (15,6%) patients we found an increase of glycemia level in the morning hours, the so-called "morning dawn phenomenon", which was dominant in children in the decompensation stage -

21,4%, and in pubertal age persons. According to the literature it is caused by activation of counterinsular hormones in children of pubertal age.

Thus, when comparing the indices of diabetic retinopathy, polyneuropathy, choriopathy, as well as hypertrophic lipodystrophy and the phenomenon of "morning dawn", depending on the indicator of the stage of the disease, we failed to identify significant differences (used method: Pearson's Chi-square). Whereas, when assessing the result of comparison of the indicator "Diabetic nephropathy" depending on the metabolic stage, significant differences ($p < 0.001$) were revealed (method used: Pearson's Chi-square).

The frequency of complications depending on the duration of the disease among the examined children and adolescents is presented in Table 3.5. Diabetic retinopathy was observed in 5 (15.2%) cases with a duration of up to 3 years. Retinopathy was significantly more frequent in patients with a duration of diabetes from 3 to 6 years and more than 6 years - 19 (59.4) and 20 (54.1%), respectively.

Single cases of diabetic nephropathy were observed in children with a duration of 3 to 6 years - 4 (12.5%), while in patients with longer duration of DM nephropathy was already observed in - 13 (35.1%) cases.

Signs of initial manifestations of diabetic polyneuropathy were observed in - 3 (9.1%) children at early stages of the disease, and with increasing duration of the disease the frequency of this pathology only increased, so in patients with a long history of DM reliable increase was registered in - 18 (56.2%) cases, in patients with a history of more than 6 years, the indicators were significantly higher than in the two previous groups and amounted to - 34 (91.9%).

The same picture was observed with the complications choriopathy and hypertrophic lipodystrophy, which were significantly more frequent in patients with a disease duration of more than 6 years - 25 (67.6%) and - 22 (59.5%) respectively, although in terms of frequency of occurrence they were inferior to diabetic polyneuropathy. The phenomenon of "morning dawn" with a reliable predominance was more often determined in pubertal age and duration of DM more than 6 years - 9 (24,3%).

Thus, when comparing the presence of complications, depending on the duration of the disease, significant differences ($p < 0.001$) were revealed (used method: Pearson Chi-square). The above-mentioned complications have a direct dependence on the degree of compensation and duration of the disease. With the increase in the length and severity of diabetes mellitus (more than 6 years, there is a real danger of formation of several chronic complications, which will naturally worsen the subsequent prognosis and negatively affect the quality of life of patients with diabetes mellitus type 1. The results we obtained were consistent with the data of earlier studies.

When analyzing the associated pathology depending on the degree of metabolic compensation, presented in Table 3.6, gastrointestinal tract pathology was more often noted in all examined children and adolescents; biliary tract dysfunction was observed in 50% of cases, with no statistically significant differences between groups ($p=0.905$).

Steatohepatosis was detected in 21.4% of children, only in subcompensation groups and with a significant predominance in the group of patients in decompensation stage - 14 (50.0%). Thyroid pathology was marked by diffuse enlargement of the thyroid gland mainly of the 1st degree in - 21 (20,5%) and chronic autoimmune thyroiditis in - 6,1% of patients. In addition to the above pathologies there were statistically insignificant single cases of chronic diseases of ENT organs and pathologies of musculoskeletal apparatus. (Table 2)

Table 2 Co-morbidities in patients depending on the degree of metabolic compensation (abs. number, %)

	Degree of compensation			P
	Compensation (n=4)	Subcompensation (n=70)	Decompensation (n=28)	
Biliary dysfunction	2 (50,0)	34 (48,6)	15 (53,6)	0,905
Steatohepatosis	0 (0,0)	7 (10,0)	14 (50,0)	< 0,001* Rsubcomp. - decomp. < 0,001
Diffuse enlargement of the thyroid gland	1 (25,0)	12 (17,1)	8 (28,6)	0,439
Chronic autoimmune thyroiditis.	0 (0,0)	3 (4,3)	3 (10,7)	0,416
Chronic compensated tonsillitis	0 (0,0)	4 (5,7)	0 (0,0)	0,386
Chronic pharyngitis	1 (25,0)	5 (7,1)	3 (10,7)	0,434
Seasonal allergic rhinitis	0 (0,0)	2 (2,9)	2 (7,1)	0,564
Posture disturbance	0 (0,0)	3 (4,3)	3 (10,7)	0,416
Flat feet	0 (0,0)	2 (2,9)	2 (7,1)	0,564
Infections of the urinary system	0 (0,0)	3 (4,3)	2 (7,1)	0,754
Secondary cardiomyopathy	0 (0,0)	1 (1,4)	3 (10,7)	0,093

* - differences of indicators are statistically significant ($p < 0.05$).

When comparing the data on comorbidities depending on the stage of diabetes, only Steatohepatosis was significantly more frequent in the group of patients with decompensation, i.e. its frequency of occurrence increased with worsening metabolic control, which may prove the influence of this factor on the course of diabetes and the achievement of compensation. For other conditions, statistically significant relationship was not found (method used: Pearson's Chi-square).

The analysis of concomitant pathology depending on the duration of diabetes mellitus showed that as the duration of diabetes increased, the frequency of thyroid enlargement increased significantly, which was significantly more frequent in the group of children with more than 6 years of diabetes - 13 (35.1%) compared to the group of children with diabetes for less than 3 years

- 2 (6.1%). In contrast, biliary dysfunction was significantly more prevalent in patients with shorter duration of diabetes - 23 (69.7%) and - 14 (43.8%), respectively.

Conclusions: According to the results of the study it was seen that in the studied groups already in the early stages of DM1-type DM1 disorders of other organs and systems are detected which negatively affects the patient's conditions.

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