



## Neurological Manifestations of Type 1 Diabetes

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**Abstract:** The article deals with study features of neurological disorders at children with diabetes mellitus type 1. The research included 47 children among them were 23 girls and 24 boys with various course of disease. The study was carried out on the base of neurology department at TashPMI and children endocrinology department in RSSPMCE (Republican specialized scientific and practical endocrinology center). The taken results showed that it was recommended timely prophylaxis of such disease.

**Keywords:** diabetes mellitus, children, neurological impairment.

Currently, type 1 diabetes mellitus (DM1) or insulin-dependent diabetes is an autoimmune disease in which pancreatic  $\beta$ -cells are destroyed. Diabetes mellitus in children ranked third among chronic diseases. Various factors contribute to the development of this disease, it can be viruses recently (COVID), toxins, stressful situations, and genetic predisposition also plays a significant role. DM requires constant monitoring of blood glucose levels and correction of insulin therapy.

To date, there are markers of glycemic control - this is the content of glucose and glycated hemoglobin in the blood, which have a number of disadvantages, as a result of which additional markers are being sought. Diabetes mellitus is a serious problem in which many organs and systems are affected, and the central nervous system is no exception. According to the International Diabetes Federation, by 2045 the number of patients with diabetes in the world will increase to 628.6 million people, while in most countries there is a documented increase in the incidence of type 1 diabetes in children.

In our country, by the end of 2020, according to the health statistics of RSSPMC of endocrinology in Uzbekistan, more than 277,000 patients with diabetes were registered, 3,280 children and adolescents under 18 years of age. One of the "targets" of the negative effects of hyperglycemia is the central nervous system (CNS).

Various pathologies of the nervous system occupy a special place among the chronic complications of diabetes mellitus, since the peculiarities of innervation contribute to the heterogeneity of clinical manifestations, the difficulty in diagnosing and choosing therapeutic measures. According to epidemiological studies, dysfunction of the nervous system in type 1 diabetes can be formed already during the first 2-8 years after the manifestation of the disease.

The main clinical complications of diabetes mellitus on the part of the brain are cognitive impairments and their dynamics, expressed in changes in higher cortical functions responsible for the implementation of the processes of cognition of the world and purposeful interaction with it. A cognitive deficit is a violation compared to the individual norm of one or more higher functions: memory, gnosis, praxis, speech, or executive abilities.

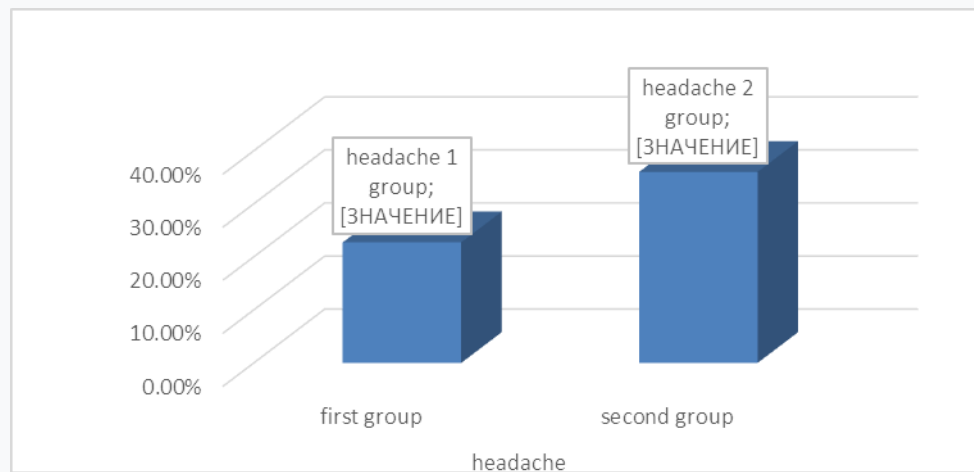
**Purpose of the study:** to study the features of neurological disorders in children with type 1 diabetes mellitus.

**Materials and research methods.** Neurological disorders that accompany many diseases are of great importance and require correction.

In this connection, clinical, neurological and diagnostic studies were carried out on the basis of the Department of Neurology of the Tash PMI and in the Department of Pediatric Endocrinology of the RSSPMCE. 47 children were examined: 23 girls (48.9%) of them, 24 boys (51.06%) with different course of type 1 diabetes.

**Results and discussion** Two groups were formed, the first group of children from 7-11 years old - 22 children (of which boys-12; girls-10) and the second group of children from 12-18 years old - 25 (of which boys 12; girls 13).

During the clinical and neurological examination, complaints of headache were made, in group I - 22.72%, in group II - 36%.



In addition, there were complaints about sleep disturbance in group I in 40.9% of children, and in group II - in 44%.

In the neurological status, small-sweeping nystagmus was detected in 13.6% of patients in the first group and in 4% in the second group.

In the motor sphere in both groups, there were such changes as a diffuse decrease in muscle tone - 45.45% and 24%, respectively,

revival of tendon reflexes among children of the first group - 59%, the second group - 52%.

In the sensitive area, there was a decrease in sensitivity on the lower limbs in group I - 27.2%, in group II - 32%. Also in both groups, changes in the coordinating sphere were revealed, these are instability in the Romberg position and intentional tremor of the hands in the 1st group - 40.9%, in the 2nd group - 48%.

In addition to the neurological examination, transcranial dopplerography of the intracranial vessels of the brain was performed in 21 patients.

In children with diabetes, signs of cerebrovascular pathology are detected already at the initial stages of the disease.

The changes were most pronounced in ACA and PCA. The anterior cerebral artery provides blood supply to the medial parts of the frontal and parts of the parietal lobes of the brain, as well as the anterior and middle parts of the corpus callosum, the anterior parts of the subcortex and hypothalamus. The internal branches of the PCA supply blood to the upper midbrain, hippocampus, thalamus, and most of the hypothalamus. As a result, neurological and neuropsychological symptoms appear with stenosis in the ACA and PCA basin. The results of the Doppler study showed that the average blood flow velocities were reduced in the examined children in 2 groups. In the first group, the indicators of the middle cerebral artery (MCA) {70.1 (66.0-79.2) cm/s;} and the posterior cerebral artery (PCA) {42.6 (37.2-44.7) cm/s; with., in the second group of the middle cerebral artery

(MCA) 78.4 (76.3-80.5) cm/s, and the posterior cerebral artery (PCA) 45.5 (44.3-46.0) cm/s. In the anterior cerebral artery (ACA) and basilar artery (BA), they did not differ from the norm.

Blood flow characteristic Groups of subjects	ACA		MCA		PCA		BA	
	Vm (sm/se k)	IR	Vm (sm/sek)	IR	Vm (sm/sek)	IR	Vm (sm/sek)	IR
Children with type 1 diabetes (n=47)	<b>57,5</b> (52; 61,5)	<b>0,59</b> (0,57; 0,61)	<b>71</b> (67; 80,5)	<b>0,57</b> (0,53; 0,60)	<b>40,5</b> (38,6; 46,0)	<b>0,58</b> (0,56; 0,59)	<b>47</b> (43,2; 51,6)	<b>0,58</b> (0,57; 0,59)
Indicators are normal	<b>58</b>	<b>0,58</b>	<b>75</b>	<b>0,50</b>	<b>52</b>	<b>0,56</b>	<b>52,0</b>	<b>0,58</b>
P	<b>0,73</b>	<b>0,57</b>	<b>0,09</b>	<b>0,04</b>	<b>0,06</b>	<b>0,08</b>	<b>0,08</b>	<b>0,91</b>

And so, cerebral hemodynamics in children with DM is characterized by varying degrees of decrease in blood supply to the arterial circulation.

The blood flow velocity in the examined veins with the conventional spectrogram was increased.

### Conclusion

Thus, in the examined children of both groups, complaints of a cerebral nature were revealed, which prevail in the second group, but neurological symptoms are pronounced in both groups.

Hemodynamic changes were found in older children, which are accompanied by a decrease in blood flow velocity in the cerebral arteries and an increase in the resistance index. The data obtained indicate that in children, signs of neurological disorders are observed already in the early stages of the disease.

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