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**GENDER CHARACTERISTICS OF THE MORPHOMETRIC PARAMETERS OF  
THE LIGHT REFRACTIVE MEDIA OF THE EYEBALL IN CHILDREN WITH  
TYPE I DIABETES MELLITUS**

**Ikromova S. B.**

[safiya-2795@mail.ru](mailto:safiya-2795@mail.ru)

Bukhara Medical Institute, Department of Ophthalmology

**Annotation:** Diabetes mellitus (DM) is one of the key medical and social problems in most countries of the world, which is one of the main priorities of national health programs [Dedov I.I., 2010; Suntsov Yu.I. et al., 2011]. Purpose: to study gender characteristics of morphometric indicators of the light-refracting parts of the eye in children and adolescents with type I diabetes mellitus. Materials and methods: Data from a survey of the morphometric parameters of the light-refracting parts of the eye in children with diabetes mellitus, 60 children from 7 to 18 years old, were analyzed for the period from 2021-2023, and 30 children with diabetes mellitus and 30 healthy children (comparison group) were examined. age and gender. Conclusions: Regardless of the severity of the disease, reactive-dystrophic pathological changes in these eye parameters were identified as a result of diabetes mellitus.

**Keywords:** diabetes mellitus, oct, pachymetry, echobiometry.

Relevance of the topic

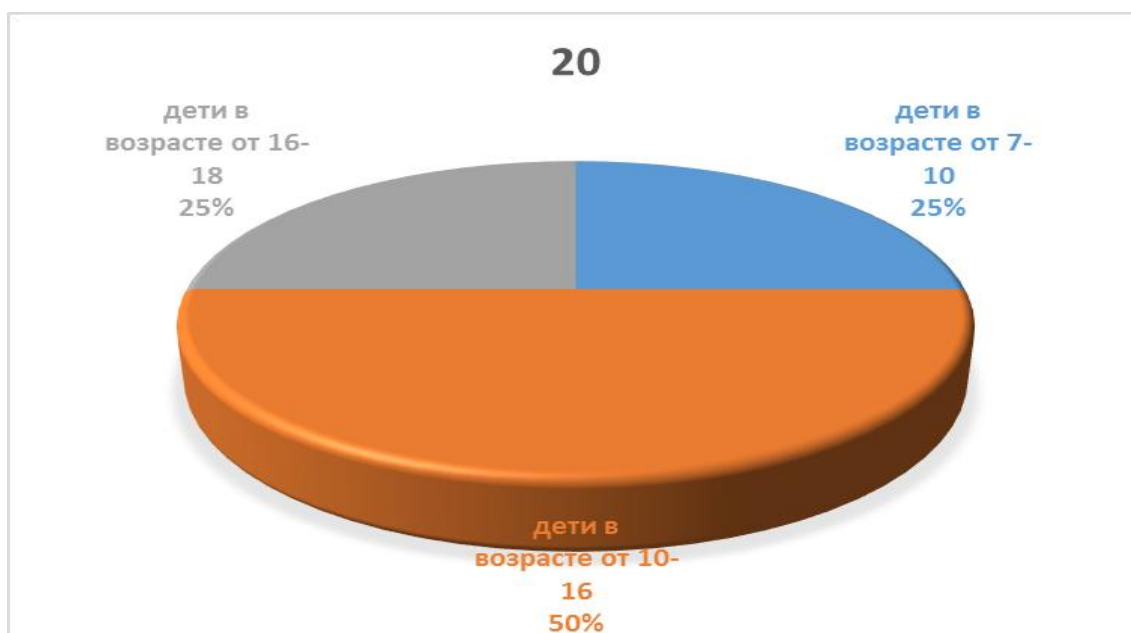
The high prevalence and increasing incidence of insulin-dependent diabetes mellitus in children, as well as the early occurrence of late vascular complications, determine the importance of the problems of prevention, early diagnosis and treatment of complications of diabetes mellitus.

Despite modern advances in diabetology, the results of treatment of type I diabetes mellitus (DM I) in children are not considered satisfactory due to the inevitable development of early chronic complications. The incidence of serious complications is especially high in young patients with childhood insulin-dependent diabetes mellitus. It is known that the course of diabetes in childhood and adolescence is characterized by extreme variability of metabolic processes and a fairly rapid increase in specific complications, such as diabetic retinopathy, nephropathy, neuropathy, etc. All this reduces the quality of life of people with diabetes and requires the closest attention of health authorities to the problems treatment of this disease in childhood and adolescence. With diabetes, all structures of the eye are affected, so its manifestations can be varied: cataracts, diabetic retinopathy, blood entering the vitreous body (hemophthalmos), retinal detachment, glaucoma. Current topics in ophthalmology and pediatric endocrinology are early diagnosis of retinopathy, the ability to identify children at risk of developing retinopathy for timely registration of changes in blood pressure, the possibility of applying treatment in the early stages and, ideally, preventing the development of complications.

**Target:** to study gender characteristics of morphometric indicators of the light-refracting parts of the eye in children and adolescents with type I diabetes mellitus.

**Materials and methods:**

Data from a survey of the morphometric parameters of the photorefractive part of the eye and fundus elements in children with diabetes mellitus aged 7 to 18 years for the period 2021-2023 were analyzed. For this purpose, 60 children were examined, who were divided into two groups: 1 - main group: 30 children with diabetes; 2 - control group: 30 healthy children. All children underwent a comprehensive examination, including ophthalmological, clinical, echographic, optical coherence tomography, ophthalmoscopy, biomicroscopy and other standard studies.



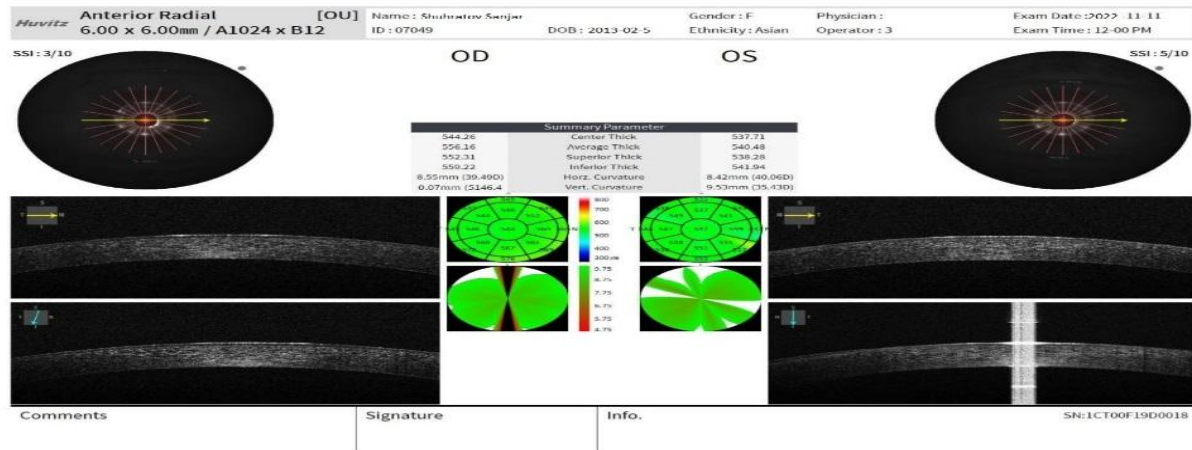
**Rice. 1.1. Distribution of children by age and health status**

**(children with type I diabetes)**

- 1 - subgroup – 10 (33%) children aged 7 to 10 years;
- 2 - subgroup – 10 (33%) children aged 10 to 16 years;
- 3 - subgroup - 10 (33%) children aged 16 to 18 years.

**Table 1.1. Distribution of healthy children and children with diabetes mellitus, taking into account age and gender**

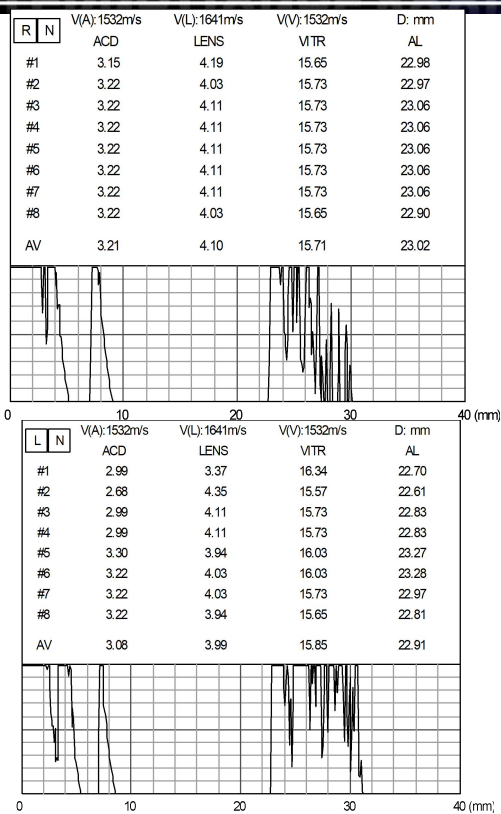
Floor		Children's age						Total	
		From 7 to 10 years		From 10 to 16		From 16 to 18		abs	%
		abs	%	abs	%	abs	%		
Children with diabetes	Boys	5	7.5	5	12.5	5	5.0	15	25
	girls	5	7.5	5	12.5	5	5.0	15	25
Healthy children	Boys	5	7.5	5	12.5	5	5.0	15	25
	girls	5	7.5	5	12.5	5	5.0	15	25



**Rice. 1.2. Morphometric parameters of corneal thickness. Patient M.K. 9 years old, diagnosed with type 1 diabetes mellitus**

The study showed that in boys (7-12 years old) with diabetes mellitus, the thickness of the cornea in the right eye ranges from 523.76 to 590.05 microns, on average  $562.80 \pm 18.79$ , and in the left eye from 515.72 to 588.93  $\mu\text{m}$ , average  $564.20 \pm 20.2$   $\mu\text{m}$ . The study showed that in boys (13-15 years old) with type 1 diabetes mellitus in the right eye, the thickness of the cornea ranges from 525.91 to 597.72 microns, on average  $568 \pm 17.64$ , in the left eye from 516.43 up to 588.27  $\mu\text{m}$ , on average  $566.26 \pm 16.2$   $\mu\text{m}$ .

**Rice. 1.3. Morphometric parameters: distance of the anterior chamber, length of the lens, vitreous body and eyeball. Patient Sh.S. 9 years old, diagnosed with type 1 diabetes mellitus**

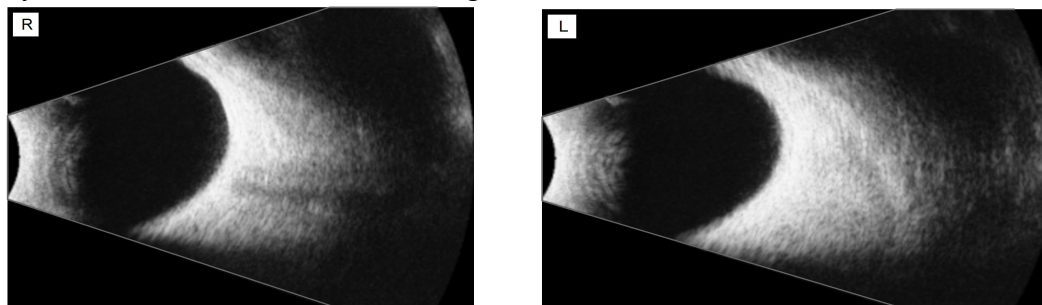


	AXIAL	0.00 mm	IOL(D)	REFR(D)
K1	0.00 D		-2.00	2.00
K2	0.00 D		-1.50	1.50
DR	0.00 D		-1.00	1.00
A	0.00		-0.50	0.50
Computing Value			0.00	0.00
D.EM	0.00 D		0.50	-0.50
D.AM	0.00 D		1.00	-1.00
			1.50	-1.50
			2.00	-2.00

	AXIAL	0.00 mm	IOL(D)	REFR(D)
K1	0.00 D		-2.00	2.00
K2	0.00 D		-1.50	1.50
DR	0.00 D		-1.00	1.00
A	0.00		-0.50	0.50
Computing Value			0.00	0.00
D.EM	0.00 D		0.50	-0.50
D.AM	0.00 D		1.00	-1.00
			1.50	-1.50
			2.00	-2.00

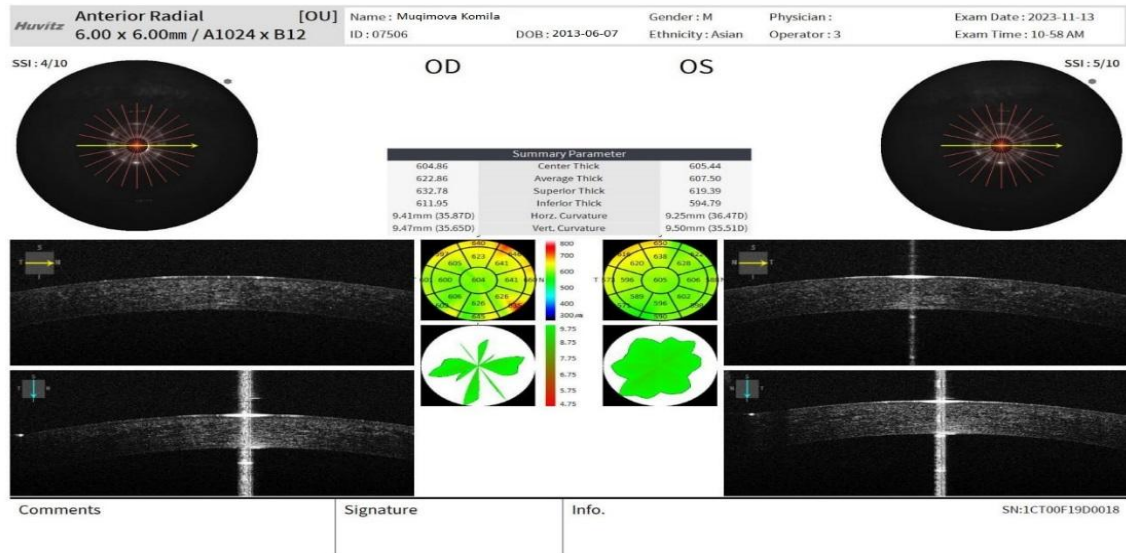
The study showed that in boys (7-12 years old) with diabetes mellitus, the length of the vitreous body varied in the right eye from 14.3 to 16.5 mm, on average  $15.3 \pm 0.70$ , in the left eye from 14.2 to 15.9 mm, average  $15.1 \pm 0.50$  mm.

The study showed that in boys (7-12 years old) with diabetes mellitus, the distance of the anterior chamber of the right eye ranges from 2.12 to 3.27 mm on average  $2.78 \pm 0.44$ , the length of the lens in this group of boys ranges from 2.56 to 4.12 mm on average  $3.47 \pm 0.39$ . The anterior-posterior axis of the eyeball in boys of this group ranges from 20.1 to 22.9 mm in the right eye, on average  $21.5 \pm 0.98$ ; in boys with diabetes mellitus, the distance of the anterior chamber of the left eye ranges from 2.06 to 3.26 mm, average  $2.76 \pm 0.44$ ; The length of the lens in this group of boys ranges from 2.54 to 4.10 mm, with an average of  $3.51 \pm 0.41$  mm. The anteroposterior axis of the eyeball in boys of this group varies in the left eye from 20.7 to 22.8 mm, on average  $21.5 \pm 0.60$ .



Rice. 1.3. Morphometric parameters of the vitreous body. Patient Sh.S. 9 years old, diagnosed with type 1 diabetes mellitus

In girls (13-15 years old) with type I diabetes mellitus, the study showed that the thickness of the cornea in the right eye ranges from 525.23 to 596.89 microns, on average  $574.71 \pm 27.6$ , and in the left eye from 516.19 to 590.64  $\mu\text{m}$ , average  $575.59 \pm 27.7 \mu\text{m}$ .



**Rice. 1.4. Morphometric parameters of corneal thickness. Patient R.N., 13 years old, diagnosed with type 1 diabetes mellitus.**

In girls (13-15 years old) with type I diabetes mellitus, the distance of the anterior chamber in the right eye ranges from 2.44 to 3.42 mm, with an average of  $3.10 \pm 0.35$ . The length of the lens in the right eye ranges from 3.14 to 4.23 mm, with an average of  $3.87 \pm 0.32$ . The anterior-posterior axis of the eyeball in girls of this group ranges from 20.79 to 23.5 mm on the right eye, an average of  $22.4 \pm 0.81$  mm, the distance of the anterior chamber on the left eye ranges from 2.47 to 3.56 mm, average  $3.12 \pm 0.36$ . The length of the lens in the left eye ranges from 3.17 to 4.26 mm, with an average of  $3.88 \pm 0.23$ . The anterior-posterior axis of the eyeball in girls of this group varies in the left eye from 20.9 to 23.5 mm, with an average of  $22.5 \pm 0.71$  mm.

It has been established that girls with diabetes aged 13-15 years have the greatest thickness of the cornea, anterior chamber, and lens compared to the age categories of 7-12 and 16-18 years. Boys with diabetes have the greatest thickness of the cornea, lens and vitreous body at the age of 16-18 years.

Research has shown that in healthy children, the optical environment increases according to age, but there is a gender difference. The volume of the optical media of the eye is greater in boys than in girls.

The study observed growth of the cornea up to 15 years in both sexes. After 16-18 years, the thickness of the cornea becomes thinner. But there is a slight difference between boys and girls in connection with the anatomical structure. (Table 1.2.)

**Table 1.2.**

	7-12 years (µm)	13-15 years (µm)	16-18 years (µm)
Boys(OU)	562.80±18.8	565.18±17.6	<b>556.63±00</b>
Girls (OU)	551.91±24.0	556.71±27.6	<b>545.69±1.28</b>

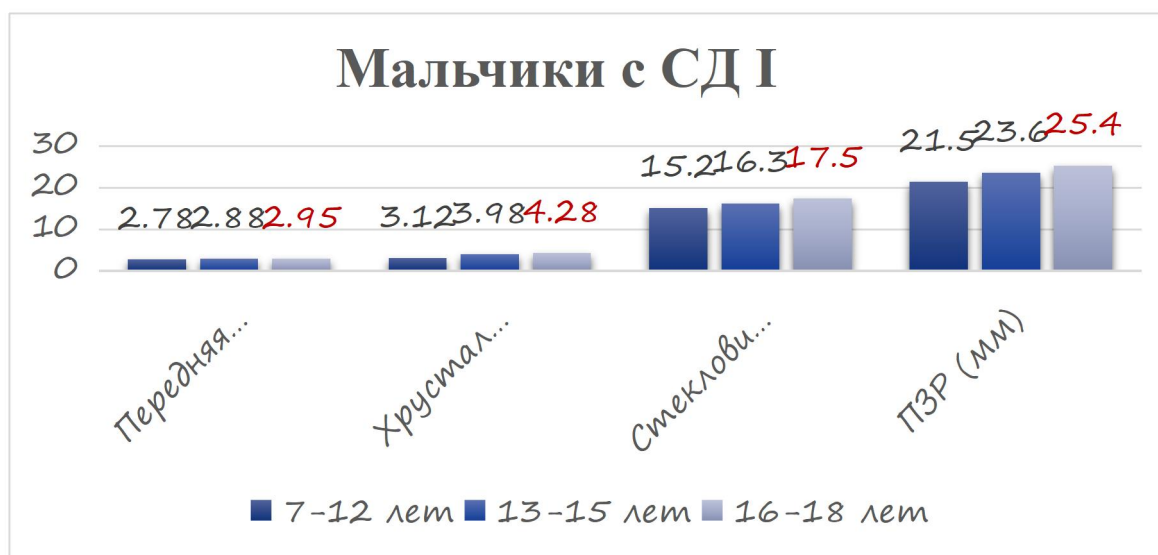
At the age of 13-15 years, in girls with type I diabetes, the cornea sharply thickens, and remains in this position at 16-18 years. In boys, thickening of the cornea is observed at 16-18 years of age. (Table 1.3.)

**Table 1.3.**

	7-12 years (µm)	13-15 years (µm)	16-18 years (µm)
Boys(OU)	552.2±27.21	568.51±28.42	<b>576.56±1.99*</b>
Girls (OU)	556.46±29.2	<b>574.63±34.6*</b>	574.86±1.28

Note: \*differences with the comparison group (healthy) are significant (p<0.05)

Morphometric parameters of the anterior chamber, lens and vitreous body of boys with diabetes mellitus are the same as in healthy boys; the same indicators are observed up to 16 years of age. At the age of 16-18 children, the indicators of all morphometric parameters increase slightly.



In girls, changes in the morphometric parameters of the optical media of the eye begin at 13-15 years of age. This is associated with the early manifestation period of diabetes mellitus in girls.



### conclusions

1. When studying the parameters of the cornea on OCT, growth of the cornea is observed up to 15 years. After that, the thickness of the cornea decreases in both sexes. The morphometric parameters of the remaining optical media of the eye develop in direct proportion to age.
2. Morphometric parameters of the cornea according to OCT studies in girls with type I diabetes at the age of 13-15 years thicken by 3.25%. And in boys with type I diabetes at the age of 16-18 years, the corneal parameters thicken by 3.5%.
3. The morphometric parameters of the lens and vitreous body in girls with diabetes aged 13-15 years increase by 3.25%, and in boys aged 16-18 years they increase by 3.5%.

Consequently, girls have a more unfavorable course of the disease, consisting in the development of chronic complications at an earlier age and in a shorter period of time compared to boys. [Dianov O.A., Kovalenko E.A., Nezherenko N.N., Zhmurkin V.V. 2010]

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