

**Assessment of hemostatic parameters in patients with type 2 diabetes, depending on the duration of the disease and the level of glycemia.**

Mukhamedova N.Kh., Alimov S., Sobirova M.R., Shukurova P.

Tashkent Medical Academy

**Abstract:** Diabetes mellitus is a common disease that leads to the development of complications in the disabled. The clinical course of SD. and the prognosis of the patient's life are largely determined by the development of vascular complications.

**Keywords:** Type 2 diabetes mellitus, hemostasis, shortening of APTT, fibrinogen, retraction, platelets.

Diabetes mellitus is a widespread chronic disease that leads to the development of disabling complications. The clinical course of diabetes mellitus (DM) and the prognosis of the patient's life are largely determined by the development of vascular complications. The frequency of macro and microangiopathies in diabetes reaches 80-100% of cases [1; 2]. According to the latest data from the International Diabetes Federation - IDF (The International Diabetes Federation), the number of patients with diabetes in 2011 was 366 million, and by 2030 the number of patients with diabetes is expected to increase to 438 million, which will account for 7.8% of the world's population. [6; 8].

In diabetes mellitus, changes in hemostasis are assigned, developing, according to modern concepts, due to the progression of metabolic disorders [3; 5; 9]. Despite the variety of forms of diabetes, the majority of patients are people with type 2 diabetes (T2DM), in different populations and ethnic groups their number reaches 80–95% [4,6,7]. Those with diabetes mellitus, violations of hemocoagulation and fibrinolysis develop

**Target.** To study the state of the hemostasis system in patients with type 2 diabetes mellitus.

**Material and methods** The research was carried out in the endocrinology

department of the multi-profile clinic of the Tashkent Medical Academy. In all groups, studies of some platelet and plasma coagulation factors were carried out. The study included 69 patients with T2DM. All patients were divided into 3 groups depending on the length of time of diabetes mellitus; Group 1 - 13 patients with disease duration from 1 to 5 years, group 2 - 29 patients with diabetes; 2 disease duration 6 - 10 years and group 3 - 27 patients with disease duration from 11 to 20 years. The control group consisted of 20 apparently healthy individuals.

In type 2 diabetes mellitus, there is a picture of hypercoagulation on the part of the hemostatic system, which creates a high risk of vascular lesions; micro and macroangiopathies. In this regard, it was of particular interest to study the parameters of hemostasis in patients with diabetes mellitus, depending on the duration of the disease.

**Table 1**

**Indicators of platelet and coagulation hemostasis in patients with type 2 diabetes, depending on the duration of the disease (M  $\pm$  m).**

Indicators of hemostasis	Duration of the disease			
	Control n=20	1 – 5 years olds n=13	6 – 10 years olds n=29	11-20 years olds n=27
Platelet (180-320 *10 <sup>9</sup> /l)	222,8 $\pm$ 8,75	242,1 $\pm$ 7,8*	252,8 $\pm$ 8,72	249,6 $\pm$ 6,77*
Retraction (0,3-0,5 c)	0,43 $\pm$ 0,03	0,37 $\pm$ 0,03*	0,26 $\pm$ 0,02*	0,38 $\pm$ 0,04 *
HAP 10 <sup>2</sup> sec (15-17)	16,3 $\pm$ 0,86	13,8 $\pm$ 0,34	12,98 $\pm$ 0,66	12,42 $\pm$ 0,62

HAP 10 <sup>6</sup> /sec (32-34)	32,88 ± 1,2	25,4 ± 1,15*	25,24 ± 0,94*	26,32 ± 0,98*
Fibrinogen (2,0-3,5 g/l)	3,26 ± 0,8	4,9 ± 0,68*	4,5 ± 0,92	4,6 ± 0,82
APTT, ( 35 – 45 sec.)	43,6 ± 2,8	28,4 ± 1,8*	26,6 ± 2,4*	26,2 ± 2,3*
Glucose mmol/l	5,9 ± 0,3	7,8 ± 0,5	9,2 ± 0,8	8,4 ± 0,6
HbA1c %	6,8 ± 0,2	7,2 ± 0,3	7,0 ± 0,2	7,4 ± 0,3

\* - the reliability of the difference between the main group and the control

According to the data obtained, in patients with type 2 diabetes, regardless of the duration of the disease, there is an increase in the functional activity of platelets. As can be seen in Table 1, there is an increase in the number of platelets in patients with different experience of diabetes, however, a clear relationship with the duration of the disease has not been established.

The same picture is observed in the study of retraction and hemolysis - the aggregation test. Most researchers consider changes in platelet hemostasis in type 2 diabetes as one of the main mechanisms for the development of angiopathy and thrombokinase. The functional affinity of endothelium and platelets is well known. The development of endothelial dysfunction in metabolic syndrome, impaired glucose tolerance and newly diagnosed diabetes mellitus have been well proven. The hyperaggregation of platelets in the early stages of the disease can be considered as the implementation of the endothelial-supporting function by the platelets. It can be assumed that the progression of metabolic disorders increases the activity of platelets, which plays an important role in the development of atherosclerosis and thrombus formation.

The study of plasma factors of blood coagulation in patients with diabetes in different periods of the disease did not show significant changes between the indicators. The shortening of APTT with a convincing difference was observed only in comparison with the control group. However, there was no significant difference in APTT in patients with different duration of the disease. An increase in hemocoagulation was revealed in the study of blood fibrinogen in patients with diabetes, at the same time, a characteristic relationship with the duration of the disease has not been established.

Analysis of carbohydrate metabolism indicators in groups of patients with different length of diabetes did not reveal a significant relationship between hyperglycemia and the duration of the disease; it turned out that the average blood glucose values in patients with a shorter duration of the disease were higher than in patients with disease duration of 11-20 years.

According to the tabular data, the level of glycosylated hemoglobin was  $6.8 \pm 0.2\%$  and  $7.2 \pm 0.2\%$  in the first and second groups, respectively, i.e. in patients with less history of the disease. In patients with a longer duration of the disease, this indicator was slightly higher. There was no significant difference between the indicators of patients with different duration of the disease.

Thus, the parameters of hemostasis in DM 2 are characterized by a significant increase in platelet function; aggregation and adhesive activity, which are found in the onset of type 2 diabetes and persist for any duration of the disease. The coagulation link of hemostasis is characterized by a decrease in APTT, an increase in the concentration of fibrinogen, a prothrombin index, a shortening of the blood coagulation time, which is observed both in the early and late stages of diabetes mellitus 2 and possibly depends on multidirectional changes in the protein-lipid parameters of the blood.

### **Conclusions.**

The parameters of hemostasis in T2DM are characterized by a significant increase

in platelet function; aggregation and retraction activities, which are found in T2DM and persist for any duration of the disease. The coagulation link of hemostasis is characterized by a decrease in APTT, an increase in the concentration of fibrinogen, a prothrombin index, a shortening of the blood coagulation time, which is observed both in the early and late stages of diabetes mellitus 2 and possibly depends on multidirectional changes in the protein-lipid parameters of the blood.

## References

1. Краснопевцева Б.И. Бондарь И.А. Особенности сосудисто-тромбоцитарного и коагуляционного гемостаза у больных сахарным диабетом первого типа. // Медицина и образование в Сибири. -2016.-№3.-С. 76-81.

2. Некрасова Е.Г., Дубенский В.В., Миллер Д.А. и др. Особенности сосудистого гемостаза, ассоциированного с сахарным диабетом у больных микозами стоп, и их лечение с коррекцией микроциркуляторных нарушений // Иммунопатология, аллергология. – 2011. – №2. – С.53-62.

3. Петрик Г, Полищук С. Показатели метаболизма и гемостаза у больных сахарным диабетом 2-го типа с различной выраженностью ангиопатии. // Проблемы эндокринологии. - 2018.-№2.- С.15-19.

4. Петина М. М., Гороховская Г. Н., Мартынов А. И. Особенности гемостаза у больных сахарным диабетом 2 типа в сочетании с ишемической болезнью сердца. // Медицинская наука и образование Урала. — 2018. — Т. 11, № 1. — С. 30–36.

5. Thomas M., MacIsaac J., Salamandrais C., Molyneux L. et al. The burden of anemia in type 2 diabetes and role of nephropathy: a cross-sectional audit. Nephrology Dialysis Transplantation 2004; Vol.19: 1792-1797.

6. Thomas M.C., Salamanders C., MacIsaac R.J., Jorums G. Epidemiology of hemoglobin levels in patients with type 2 diabetes. American Journal of Kidney Diseases 2018; 48: 537-545.

7. Thomas M.C., Weekes A.J., Broadly O.J. et al. The burden chronic kidney disease in Australian patients with type 2 diabetes (the Nephron study). The Medical Journal of Australia 2019; 185: 140-144.

8. Watkins P.J. et al. Erythropoietin responsive anemia in diabetic neuropathy with and without nephropathy. Diabetology 2019; 41 [Supply 1]: A309.

9. White K.E., Marshall S.M., Bilious W. Are glomerular volume differences between type 1 and type 2 diabetic patients pathologically significant? Diabetology 2018; 50 (5): 906-911.