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STATE OF THE HAEMOSTATIC SYSTEM IN NEWBORNS FROM MOTHERS INFECTED WITH HERPES VIRUS

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Summary. *The state of the haemostatic system (platelet and coagulation factor, clotting time) has been studied among 280 newborns from mothers infected with herpes virus (herpes simplex virus type 2, cytomegalovirus). An imbalance of the haemostatic system, namely, hypercoagulation against the increased risk of developing thrombosis background has been established in newborns with fetal infection.*

Keywords: *newborn, herpes virus infection, fetal infection, haemostatic system.*

Introduction. According to the published sources data, all pathological conditions of the early period of neonatal adaptation go along with changes in the haemostatic system [3, 4, 6, 7], in particular with regard to infectious diseases, but the peculiarities of the haemostatic system in newborns from mothers infected with herpes virus have not been insufficiently studied.

Objective of the study. The aim was to study peculiarities of the haemostatic system in newborns from mothers infected with herpes virus.

Materials and methods. The study involved 320 infants including 280 children (study group) born from women infected with herpes virus. One hundred children were born from mothers infected with herpes simplex virus type 2 (HSV 2), 100 from mothers infected with cytomegalovirus (CMV) and 80 from mothers infected with both CMV and HSV2. The control group consisted of 50 newborns from somatically healthy women.

Fetal infection (FI) diagnosis in newborns was verified on the basis of clinical, serological, immunological, morphological and immunohistochemical examinations. 157 (56.1%) out of 280 children were diagnosed with FI while the rest 123 were not confirmed with FI diagnosis.

Investigation of the haemostatic system parameters was being performed at the end of the first 24 hours of life, as previous studies proved that exactly at this time the most significant changes that have strong diagnostic and prognostic significance are revealed [5].

Platelet level state of the homeostasis system of the newborns from mothers with TORCH-infection was investigated using [1, 2]:

a) method of counting the number of platelets in the blood smears by Fonio (x109 / l), MBI-15 microscope;

b) mean platelet volume, vial, relative platelet count by volume,% trombokrit % (determined by hemoanalyzer BC-3000 Plus);

c) method of adenosine phosphate (ADP)-induced platelet aggregation with the definition of the index by Weiss,%.

To assess the procoagulant level, following indices were determined:

a) prothrombin index (PTI) by A.J. Quick (1935), %;

b) recalcification time, sec.;

c) fibrinogen and fibrin concentration by the R.A.Rutberh method (1961), standardized by a scientific production company «Simko LTD», Lviv, (g/l);

d) paracoahulation products content — test for soluble fibrin (fibronogen B) by the Cummine et Lyons method (1948), (+ -).

Clotting time was assessed by the V.H.Suharev standardized method (1960), min.

The results and their discussion. Clotting time analysis as an integral indicator of the haemostatic system (Table 1) showed the tendency to decrease in newborns to infected mothers, a significant difference was established in children with FI as compared to the control group indicating increased coagulation potential in neonates studied groups.

According to the findings, the decrease in platelet count was registered in the newborns from infected mothers (Table 2), especially pronounced in children with FI [(194,2 ± 15,1) x109/L vs (258,1 ± 17,5) x109/l in women of the control group, $p < 0.05$]; there is tendency towards their average size growth, with no change in the platelet distribution width volume. Determination of the trombokrit parameter revealed a tendency towards its lowering in all major groups of children while children with FI demonstrated the difference of 13.1%. At the same time, an increase in platelet aggregation activity was registered by the value index of ADP-induced aggregation in children with FI [(71,7 ± 2,4)% vs (58,7 ± 3,4)% in children of the control group , $p < 0.05$].

Modifications of the coagulation factor of hemostatic system in newborns from infected mothers have also been found (Table 3). Meanwhile, prothrombin index and fibrin and fibrinogen concentration in children study groups did not differ significantly.

Infants with FI demonstrated the most significant changes of the recalcification time index [(58,1 ± 8,7) vs (87,9 ± 8,6) in the children of control group, $p < 0.05$]. Also, a major increase in fibrin degradation products has been found (positive values of fibrinogen B in 90% and 45 % of children with FI signs and without such signs respectively vs 15.0 % of infants of the control group, $p < 0.05$), while high positive values (+++) were observed in 10 % of children with FI, whereas the control group of newborns did not show such cases. Such changes in coagulation level indicate hypercoagulable status.

Table 1

Clotting time in newborns examined within the first 24 hours of life in

Index	Index value in groups of examined children		
	FI, n = 157	without FI signs, n = 123	Control, n = 50
Beginning	(202,1±3,9)*	220,0±4,7	227,5±3,4
End	(255,5±4,8)*	267,4±4,2	277,6±5,2

Note. — *The difference was significant for the newborns control group index, ($p<0,05$).

Table 2

Platelet level indices of the haemostatic system in newborns examined within first 24 hours of life

Index	Index value in groups of examined children		
	FI, n = 157	without FI signs, n = 123	Control, n = 50
Platelet count, $\cdot 10^9$/l	(194,2±15,1)*	245,2±16,1	258,1±17,5
Mean platelet volume, fl	8,9±0,3	8,2±0,4	8,0±0,5
Platelet distribution width volume, %	14,9±0,4	13,5±0,3	13,6±0,6
Trombokrit, %	(191,3±10,3)*	205,1±10,9	220,2±12,3
ADP-induced aggregation index, %	(71,7±2,4)*	61,0±3,2	58,7±3,4

Note. — *The difference was significant for the newborns control group index, ($p<0,05$).

Table 3

Coagulation level indices of haemostatic system in newborns examined within the first 24 hours of life

Index	Index value in groups of examined children		
	FI, n = 157	without FI signs, n = 123	Control, n = 50
Prothrombin index,%	109,4±11,3	87,3±11,0	90,5±9,8
Recalcification time, sec	(58,1±8,7)*	82,3±9,5	87,9±8,6
Fibrinogen B,% by activity: a) +	35,0	25,0	10,0
b) ++	45,0	20,0	5,0
c) +++	10,0	-	-
Fibrinogen, g/l	2,1±0,29	2,5±0,14	2,6±0,15
Fibrin, g/l	9,8±0,4	9,0±0,3	8,9±0,5

Note. — *The difference was significant for the newborns control group index, ($p<0,05$).

Thus, our studies testify to a negative effect of herpesvirus infection in mother's organism on the state of the haemostatic system in her newborn.

Modifications in platelet level by increasing platelet aggregation activity and lowering of their quantity in children with FI indicate an increased risk of thrombosis.

Along with that, the discovered hypercoagulation with increased content of fibrin degradation products is the evidence of the increased coagulation potential and risk of DIC (disseminated intravascular coagulation) syndrome.

Thus, in newborns from mothers with herpes virus infection with confirmed FI a hypercoagulation has been detected against the increased risk of developing thrombosis background.

Conclusions. The established high frequency disturbances of the adaptation period in newborns with intrauterine herpes virus infection is stipulated not only by the direct negative impact of infection and impaired immunity, but also by the established imbalance of adaptation systems, particularly, haemostatic system, namely, hypercoagulation against the increased risk of developing thrombosis background.

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