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PHOSPHOLIPIID STRUCTURE AND STATES OF LIPID PEROXIDATION OF ERYTHROCYTE MEMBRANES IN NEWBORN FROM MOTHERS WITH HESTOSIS COMBINED WITH CHRONIC PYELONEPHRITIS

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Annotation
A complete clinical and laboratory examination of 69 newborns was carried out, of which 23 children were born from physiologically healthy mothers (control group), 20 children were born from mothers who had only preeclampsia during pregnancy (group 1), and 26 children (group 2), born from mothers with the 2nd and 3rd degree of preeclampsia and chronic pyelonephritis.
Having considered the nature of changes in lipid peroxidation, the phospholipid spectrum of the lipid bilayer of erythrocyte membranes in healthy newborns and those born from mothers with pure combined preeclampsia, it should be noted that there are the most profound changes in the structure of cytomembranes in newborns whose gestation proceeded against the background of preeclampsia, combined with chronic pyelonephritis, about as evidenced by the accumulation of lysoforms of phospholipids, the end products of lipid peroxidation.

Keywords: pyelonephritis, preeclampsia, erythrocyte membrane, newborns.

Introduction

The most important condition for successful completion of pregnancy and full birth is the absence of extragenital pathology in pregnant women [10,12], as high peri- and neonatal morbidity and mortality are formed in the antenatal period of pregnancy [1,2]. In recent years, against the background of declining quality of reproductive health of women of childbearing age, the number of children with adverse factors in ontogeny has increased by 80-85%. One of the reasons for the increase in preeclampsia

in the population of pregnant women is the increase in the number of women with kidney disease. Much work has been devoted to these issues in the specialized literature.

However, despite the obvious negative effects of chronic pyelonephritis and gestosis of pregnancy on fetal development and the ability of the newborn to adapt, the characteristics of their combined effects deserve special attention.

The aim of the study was to study the characteristics of blood phospholipase activity, the state of lipid peroxidation and the phospholipid structure of erythrocyte membranes only in infants born to mothers with gestational gestosis and chronic pyelonephritis and gestational gestosis.

Materials and Methods

We examined 69 newborns, including 23 infants born to physiologically healthy mothers (control group), 20 infants born to mothers who had only gestosis during pregnancy (1 group), and 26 infants. Children (groups 2) born to mothers with 2nd and 3rd degree gestosis and chronic pyelonephritis underwent a complete clinical and laboratory examination.

The studies were conducted on days 1 and 6 of children's lives. General clinical examinations include the collection of family and obstetric anamnesis data, inquiries of concomitant diseases, the study of the peculiarities of pregnancy and childbirth, the description of the early neonatal period, the general assessment of the child's condition includes [11]. The spectra of phospholipids of erythrocyte membranes were determined in Silufol using thin-layer chromatography [7]. The intensity of LPO (lipid periosteal state) processes was evaluated by the amount of malondialdehyde in erythrocyte membranes according to D. Stalnaya et al [6] .4. [3,4]. The ratio of lysophosphatidylcholine (LFX) to phosphatidylcholine (FX) was analyzed separately taking into account the cytotoxic effect of the former and the protective effect of the latter as an endogenous biooxidant [8,13].

Research Results

The results of a study of healthy newborns during early neonatal adaptation showed a clear modification of the phospholipid structure of erythrocyte membranes (Table 1).

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Table 1 LPO and phospholipid membrane spectrum indices (M ± m) in healthy newborns

Indicators	Youth Day		P
	1	6	
Malon dialdehyde (MDA, nmol / l)	4,18±0,23	3,12±0,27	<0,01
Phospholipase activity of blood	12,3±1,2	8,2±0,71	<0,01
(QFA% hemolysis)	38,7±1,93	45,4±2,04	<0,05
Total phospholipids (UFmmol / l)	7,0±0,31	4,0±0,15	<0.001
Lysophosphotidylcholine (LFX,%)	22,3±1,36	27,6±1,29	<0,01
Sphingomyelin (SFM,%)	28,2±1,27	22,0±1,50	<0,05
Phosphotidylcholine (FX,%)	22,5±1,27	30,2±1,43	<0,001
Phosphotidiletanolamine (FEA,%)	20,1±1,41	18,9±1,05	<0,05
Phosphatidylserine (FS,%)	0,840±0,04	1,466±0,005	<0,001
FOO / FQO	0,268±0,008	0,172±0,002	<0,001

The table shows that the total phospholipids in the erythrocyte membranes of newborns were 38.7 ± 1.93 mmol / l on the first day and 45.4 ± 2.04 mmol / l on the sixth day (R<0, 05). However, easily oxidized FOO, which was 7.0 ± 0.31 mmol / l on day 1, was significantly reduced on day 6 (R<0.001). The same multidirectionality is present in the dynamics of TPh: phosphatidylcholine (FX) decreases from 28.2 ± 1.79 to 22.0 ± 1.50, while sphingomyelin (SFM) decreases from 22.3 ± 1.36 in 1. 27, increases to 6 ± 1.29% (to 6 ± 1.29%). R<0.001). The marked changes were reflected in the FOO / FQO ratio, which was 0.840 ± 0.04 on day 1 and 1.466 ± 0.005 (R<0.001) and LFX / FX (R<0.001) on day 6.

The noted properties of the phospholipid spectrum of erythrocyte membranes in healthy newborns reflect the structural basis of the body's functional and adaptive responses and are adaptive in nature. Phospholipid levels of erythrocyte membranes on day 1 of life were accompanied by elevated levels of established MDA (4.18 ± 0.23 nmol / mg lipids) and FAA (12.3 ± 1.2% hemolysis), which on day 6 3 12 ± 0.27nmol / mg of lipids (R ± 0.01) and 8.2 ± 0.71% hemolysis (R<0.01), respectively, we initialized. We rated them as normative indicators. In infants born to mothers with gestosis only, blood phospholipase activity (QFA) on day 1 of life was healthy (16.3 ± 0.7% hemolysis, p <0.01) and MDA (8.3 ± 0, 2 nmol / mg lipids, p 0.001) compared significantly.), which is associated with the stimulation of free radical lipid oxidation due to disturbances in the fetoplacental system specific to preeclampsia (Table 2).

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Table 2. Comparative dynamics of lipid peroxidation and phospholipid spectra of erythrocyte membranes in the early neonatal period in newborns of mothers with pregnancy only histosis and chronic pyelonephritis types (M ± m)

Indicators	Healthy (n=23)	Babies born to mothers with gestosis				
		1 group	P	2 group	P	P_1
From 1						
QFA (% hemolysis)	12,3±1,2	16,3±0,7	<0,01	22,4±1,4	<0,001	3,90
MDA (mmol // lmmollipids)	4,18±0,23	8,3±0,2	<0,001	9,3±0,2	<0,001	<0,01
UF (mmol / l)	38,7±1,13	32,7±1,6	<0,01	28,6±2,1	<0,001	>0,05
LFX (%)	4,0±0,31	12,9±0,8	<0,001	15,1±0,8	<0,001	>0,05
SFM (%)	22,3±1,36	24,7±0,6	>0,05	31,4±0,3	<0,001	<0,001
FX (%)	28,2±1,79	25,7±1,2	>0,05	22,4±0,6	<0,01	<0,05
FEA (%)	22,5±1,27	17,8±1,3	<0,05	14,7±0,4	<0,001	<0,05
FS (%)	20,1±1,41	18,9±0,1	>0,05	16,6±1,4	>0,05	>0,05
From 6						
QFA (% hemolysis.)	8,2±0,71	14,1±0,7	<0,001	17,4±1,3	<0,001	<0,05
MDA (mmol / l lipids)	3,3±0,27	4,2±0,2	<0,05	5,2±0,4	<0,001	<0,05
UF (mmol / l)	45,4±2,04	34,7±1,3	<0,001	29,1±1,2	<0,001	<0,01
LFX (%)	4,0±0,15	11,4±0,7	<0,001	16,7±0,9	<0,001	<0,001
SFM (%)	27,6±1,29	28,2±1,2	>0,05	28,6±0,8	>0,05	>0,05
FX (%)	22,0±1,50	25,7±1,4	>0,05	21,9±0,8	>0,05	<0,05
FEA (%)	30,2±1,43	15,8±1,3	<0,001	19,8±0,1	<0,001	<0,01
FS (%)	15,9±1,05	18,9±1,2	>0,05	13,0±0,1	<0,01	<0,001

Note: Significance of differences compared to P-healthy; P1 - reliability of indicators of healthy newborns, as well as infants born to mothers with histosis and combined histosis.

The table shows that these values are significantly higher in the group of neonates who continued in the background of preeclampsia with chronic pyelonephritis (22.3 ± 1.36% hemolysis and 9.3-10.2 nmol / mg, respectively). lipids). p <0.001) Decreased total phospholipid levels in both groups of newborns (32.7 ± 1.6 and 28.6 ± 2.1 mmol / l, 38.7 ± 1.13 mmol / l, respectively, p < 0.05 and 0.01), newborns of mothers with preeclampsia only in group 2 had slightly lower (P> 0.05) FAC and MDA values than children in group 1 by day 6 of life, respectively. decreases, but remains high.

In healthy children (14.1 ± 0.7% hemolysis, P <0.001 and 4.2 ± 0.02 nmol / mg lipids, p <0.05, respectively). Total phospholipid levels are slightly elevated (P> 0.05) and significantly lower than in healthy children (34.7). ± 1.34 mmol / l, P <0.001). The data obtained show a significant increase in lipid peroxidation processes in newborns from mothers with preeclampsia. Phospholipid spectra of erythrocyte membranes in newborns increases towards the increase in the amount of fractions and the accumulation of cytotoxic fractions (Table 3).

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Table 3. Dynamics of FOO and FQO of erythrocyte membranes in the neonatal period in newborns and healthy infants born to mothers with preeclampsia (M ± m)

Indicators	Babies					
	Healthy (n=23)	1 group (n=20)	P	2 group (n=26)	P	P_1
From 1						
FOO/FQO	0,840±0,040	0,727±0,016	<0,01	0,549±0,018	<0,001	<0,001
LFX/FX	0,268±0,008	0,502±0,005	<0,001	0,680±0,016	<0,001	<0,001
From 6						
FOO/FQO	1,466±0,005	0,875±0,018	<0,001	0,650±0,015	<0,001	<0,001
LFX/FX	0,172±0,002	0,444±0,013	<0,001	0,762±0,012	<0,001	<0,001
P_2	<0,001	<0,001		<0,001		
P_3	<0,001	<0,001		<0,001		

Note: R is the significance of the differences compared to healthy. Significance between groups P1-1 and 2; P2 is the significance of differences in FOO / FQO in days 1–6 of life; P3 is the reliability of the differences between LFX / FX at 1-6 days of life.

Table 3 of healthy newborns shows that the LOF / TOF index on day 6 of life increased from 0.840 ± 0.015 due to an increase in PEA from 22.4 ± 1.22% to 30.2 ± 1.45%. Increases to 1,466 ± 0.005 (P <0.001) and decreases in FX from 28.2 ± 1.76% to 22.0 ± 1.42% (p <0.05). The LFX / FX ratio also decreased from 0.268–0.008 to 0.172 ± 0.002 (p <0.001), as a decrease in FX (21.2%) resulted in a relatively sharp decrease in LFX (42.8%). In healthy newborns, this dynamic reflects the adaptive rearrangement of lipid erythrocyte membranes.

A comparative description of the phospholipid spectra of QFA, MDA, and erythrocyte membranes by the end of the early neonatal period in newborns of mothers with group 1 and 2 preeclampsia. The FOO / FQO ratio in newborns from mothers with combined SHPG-gestosis (group 2) was similar to that in newborns from group 1 (0.549 ± 0.018 and 0.727 ± 0.016, P <0.05, respectively) and healthy (P <0.001) is relatively reduced. Due to the involvement of FOO in peroxidation processes, it seems that the more active metabolic consumption of FOO, as a result of which the FQO fraction clearly predominates.

Thus, by the end of the early neonatal period, QFA and MDA were significantly increased in infants born to mothers with preeclampsia, including those born with preeclampsia, as well as in infants born to mothers with preeclampsia (chronic pyelonephritis). 17.4 ± 1.37% hemolysis and 5.16 ±), respectively). 0, 42 nmol / mg lipids, R <0.05), which indicates a high intensity of free radical oxidation processes of lipids in them (Fig. 1).

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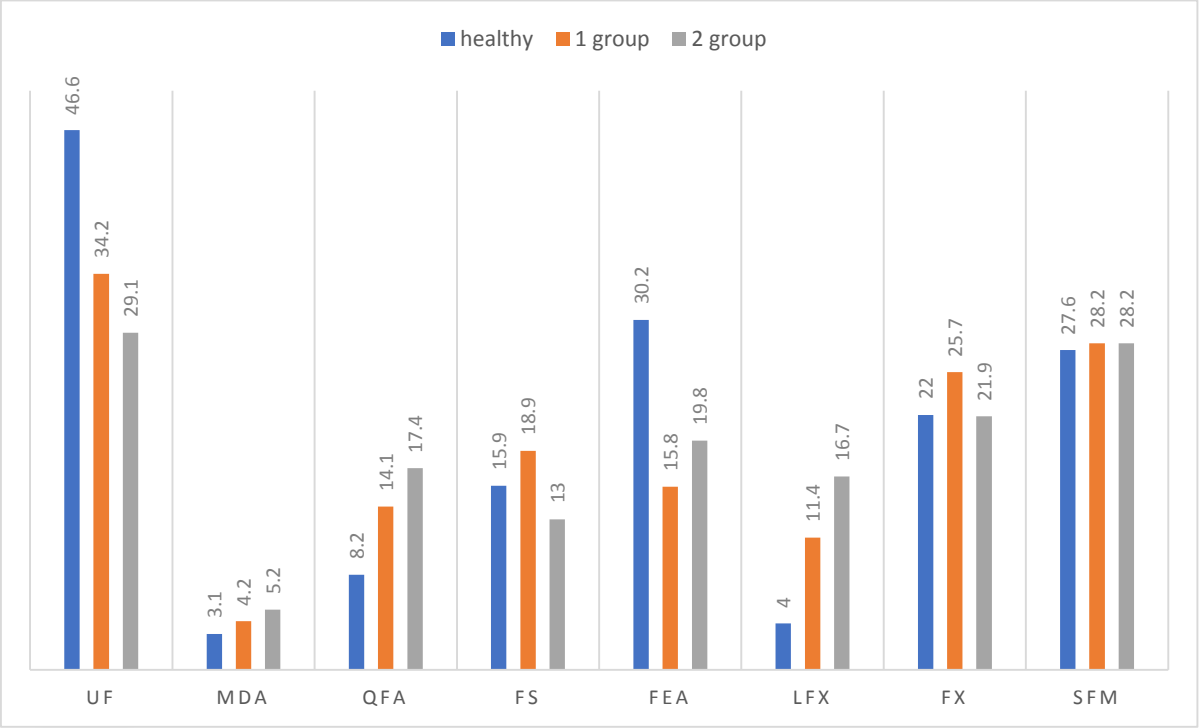

As can be seen from the figure, the amount of easily oxidized phospholipids (FEA, FS) in the LFX model corresponds to significantly lower values compared to the significantly higher level of cytotoxic fraction of phospholipids in group 1. (P-0.01).
Thus, in infants born to mothers with combined gestosis, the FEA level is significant against the background of a sharp decrease in phospholipid levels by the end of the early neonatal period (29.1 ± 1.12 mmol / l 45.6 ± 2.04 mmol / l, P. <0.001). (19.8 ± 0.1% 30.2 ± 1.43%, P <0.001), PS (13.020.1 15.9 ± 1.05%, p <0.01), and vice versa. A sharp increase in LFX content (16.7 + 0.9% at a ratio of 4.0 ± 0.15%, p <0.001).

Conclusion

LPO parameters in healthy newborns and infants born to mothers with histosis and chronic pyelonephritis are due to changes in the phospholipid spectrum of the lipid layers of erythrocyte membranes.
When considering the nature of changes in lipid peroxidation, the phospholipid spectrum of the lipid layers of erythrocyte membranes, It should be noted that the changes are present in children born to mothers with chronic pyelonephritis combined with gestosis. Changes in cytomembranes in infants born on the background of gestational gestosis with chronic pyelonephritis, the end products of lipid peroxidation are associated with the accumulation of phospholipid lysoforms.
These data suggest that children of this age should receive antioxidant and membrane-strengthening treatment early.

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