

ANALYSIS OF THE IMMUNITY INDICATORS OF PREMATURE NEWBORNS DEPENDING ON THE TYPE OF NUTRITION

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ABSTRACT

The article discusses some aspects of the functioning of the immune system of a premature baby, in particular the cytokine status. A separate part of the article is devoted to the intestinal microbiota and the role of breast milk in the formation and development of immune functions.

Key words: premature newborns, immunity, cytokines.

INTRODUCTION

Miscarriage of pregnancy and the birth of children with low body weight (less than 2500 g) as a result of premature birth or intrauterine fetal development delay is one of the most pressing problems of obstetrics and neonatology [1, 2, 7]. According to WHO, the proportion of such children among newborns ranges from 5 to 16%. In developed Western countries, the birth of small children is registered in 4-12% of all births, and in Kazakhstan 20,000 small children are born annually. Perinatal mortality of small children is 6-10 times higher than that of newborns with normal body weight, and perinatal morbidity ranges from 70 to 80% and is an

important social and economic problem for the state due to the high costs of nursing, rehabilitation and social adaptation of such children [3, 4, 6].

A global analysis of the mortality of children under the age of 5, conducted by the World Health Organization (WHO) in 2018, showed that 47% of deaths occur in the first month of life, a third of them in the category of premature newborns [5].

Children born with low body weight die 25 to 30 times more often than children of normal body weight, and account for 55 to 65% of the number of deaths in the first year of life.

The success of modern neonatology in the care of premature babies has led to a significant reduction in mortality among children born prematurely. Difficulties in the care of premature babies are primarily associated with their morphofunctional immaturity, expressed in the inability to exist in prenatal conditions[10-20]. The high susceptibility of premature infants to infectious agents causes a high frequency of infectious diseases and complications, which are severe and can result in an unfavorable outcome. Immaturity of the immune response as one of the most important components of the morphofunctional immaturity syndrome underlies the high frequency and severe course of infectious diseases of premature infants, as well as inadequate (compared with full-term infants) response to non-infectious agents (foreign proteins, invasive manipulations). Understanding the functioning of the immune response of premature infants can become an important link in the strategy of their successful nursing.

The aim of our study was to study the cytokine profile of premature newborns.

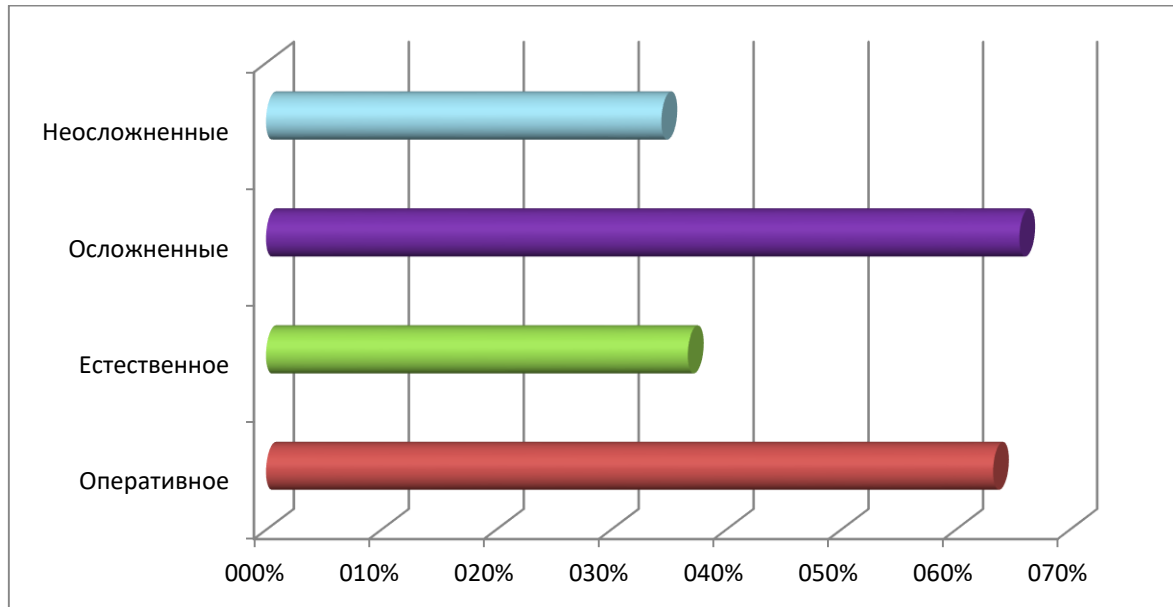
Material and research methods. We examined 125 premature newborns born in the perinatal center of the Bukhara region in the periods 2022-2023. The main group was divided into 2 groups: premature newborns receiving only parenteral nutrition - 40 newborns, premature newborns receiving parenteral nutrition with minimal enteral nutrition - 40 newborns. The comparison group consists of 45 healthy full-term newborns. The gestational age of the examined newborns was 24-28 weeks. All newborns were studied (IL-1b and IL-10) - in blood and urine on the 22nd day of life.

Newborn children were included in the study after receiving the written informed consent of the mother.

When distributed by gestation period, 38 (31.1%) newborns were born at 28-34 weeks and the highest frequency of premature birth occurred at 35-37 weeks - 52 (68.9%), all healthy newborns of the control group (30) were born at 38-42 weeks.

When distributed by the method of delivery, 76 (63.3%) births were performed surgically (Cesarean section), 44 (36.7%) births were performed by natural delivery.

During the course of labor, 79 (65.6%) were complicated by obstetric pathology in combination with extragenital disease of the mother, and 41 (34.4%) of labor proceeded without complications (Chart.1).



Determination of cytokines in the urine of newborns the advantages of noninvasive immunodiagnostics in neonatology have been established.

The analysis of the clinical course, premorbid background, obstetric-somatic anamnesis and the influence of exogenous factors was carried out using questionnaires developed by us.

RESEARCH RESULTS

The results of the immunological examination of children showed that a characteristic feature for newborns of the first group (premature newborns who received only parenteral nutrition) there was a significant increase in the level of IL-1b in the early neonatal period – 5.77 ± 0.78 p μ g/l ($p < 0.001$) versus the control – 4.54 ± 0.65 p μ g/l, which is 1.4 times more. And the IL-10 indicators of children in this group are 1.7 times higher than those in the control group (up to 10.85 ± 1.2 versus the control - 8.3 ± 1.1). IL-1b in the group of newborns who received parenteral nutrition with minimal enteral nutrition was 1.8 times higher than the indicators of the control group. IL-10 was also increased to 11.02 compared to the group of healthy newborns- 8.3 ± 1.1 ($p < 0.01$) (Table 1).

Table 1

Cytokines	Healthy newborns		Parenteral nutrition (n=40)		Parenteral nutrition with minimal enteral nutrition (n=40)	
	Min-max	Average	Min-max	Average	Min-max	Average
IL1b	0,32-19,02	4,54±0,65	1,6-24,4	6,4±0,78	0,24-18,8	7,9± 0,67**
IL-10	0,36-28,2	8,3±1,1	1,56-31,06	10,85±1,2	0,56-28,2	11,02±1,18

In premature infants, all the main links in the formation of immunological tolerance are immature, which dramatically reduces the chances of its successful formation and increases the risks of severe infectious complications. Thus, the permeability of the intestinal barrier in premature infants in the first days and weeks of life is very high, the number of dendritic cells and their functional activity are reduced, and the concentration of some signaling molecules that trigger a cascade of reactions towards the generation of T-regulatory cells (in particular, retinol and its derivative, retinoic acid) is reduced. An important component of the formation of immunological tolerance of the gastrointestinal tract is the composition of the intestinal microbiota. In premature (especially preterm) children, the composition of the intestinal microbiota is disrupted initially, and these disorders are often maintained and deepened due to the child's stay in the intensive care unit, the use of antibacterial drugs, the lack of breast milk in his diet. Such disorders in the composition of the intestinal microbiota not only do not contribute to maintaining the immunological balance, they predispose to the formation of severe infectious complications in a premature baby, including necrotic enterocolitis. [2].

The analysis of the microflora (obligate and conditionally pathogenic) of the colon revealed features depending on the weight of children at birth. In the neonatal period, all children, regardless of body weight, had a deficiency of bifidoflora. By the time of discharge from the hospital in 78.3% of children with ONMT, bifidobacteria were registered in the amount of 10⁹ CFU/g, in 17.4% the indicators were below normal and in 4.4% these representatives were not detected. In children with ENMT, bifidobacteria in the amount of 10⁹ CFU/g were observed in 71.4% and in 28.6% were below normal.

The formation of lactoflora is significantly delayed compared to bifidobacteria. In children with a body weight of less than 1000 g, lactobacilli were not detected in the neonatal period, in comparison with children with very low body weight, in whom the absence of these representatives was noted in 86.9%; in 4.4% of children, the indicators were below normal and in 8.7% lactobacilli were recorded in the amount of 10⁶ – 10⁷ CFU/g.

Conclusions

Thus, the available scientific data allow us to get an idea of the low-specific pro-inflammatory orientation of the immune response of a premature baby, the relative insufficiency of the compensatory anti-inflammatory response. Immaturity and reduced activity of innate protective factors not only increase the susceptibility of a premature baby to infectious complications, but also predispose to their severe course.

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