ORIGINAL RESEARCH

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CLINICAL AND LABORATORY EVALUATION OF MULTIPAROUS WOMEN WITH IRON DEFICIENCY ANEMIA

The aim of study is to evaluate the vitamin -mineral complex and the clinical course of pregnancy in all three trimesters of pregnancy among multiparous women suffering from iron deficiency anemia among the population of Azerbaijan. The study was conducted on 110 pregnant women between 18-44 years old during 2014-2022. The I group (control group) consisted of 21 healthy women. The II group (the comparison group) included 30 women without anemia, and the III group (the main group) included 80 multiparous women with anemia. Hemogram, vitamin and mineral content in the blood of pregnant women was studied using clinical and laboratory examination methods. The obtained results were analyzed by discriminant and variance analysis methods. The risk of pregnancy loss was noted in 6 (20,0%) cases in the comparison group and 36 (45,0%) cases in the main group (pH = 0,017). Premature rupture of membranes during childbirth was in 2 (6,7%) cases in the comparison group and in 41(51,2%) (pH <0.001) in the main group. Primary weakness of labor activity during childbirth was found to be in 5 (16,7%) cases in the comparison group, and in 19 (23,8%) cases in the main group (pH=0,132). Due to increased demand for vitamins and minerals during pregnancy, significant changes occured in multiparous women with iron deficiency anemia who were not treated (in the main group). For example, vitamin D in the third trimester was 30,1±1,6 Me=32,7(28,1-33,4) in the comparison group, while in the main group, it was 14,2±0,4 Me=13,5 (12,9-15,6) (pH<0,001), compared to the control group p<0,001. Clinical signs, hemogram, and vitamin-mineral complex deficiency have been determined in pregnant women. Compared to the control group, pregnant women with IDA had a significant deficit of micronutrients. This is more pronounced in the last trimester of pregnancy. These facts are also reflected in the laboratory tests. The reason is that the vitamin-mineral complex undergoes serious changes near the end of pregnancy due to the intensive growth of the fetus.

Keywords: multiparous women, anemia, vitamins, minerals

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Introduction. Iron deficiency is the most common condition in the world, affecting more than 2 billion people. Although widespread in underdeveloped countries, it remains a significant problem even where other forms of malnutrition have been actually eliminated [15]. Anemia develops during pregnancy and affects more than half of women in the world. This is a condition in which the number of red blood cells is not enough to meet the physiological needs of the body to provide a sufficient amount of oxygen [10].

A physiological pregnancy and proper fetal development are impossible in the absence of vitamins, microelements, and minerals. Nutritional deficit in the pregnant woman's body causes issues throughout the gestational phase, and deterioration of the health of the newborn, as well as the development of a wide range of chronic diseases of the offspring [3].

Until now, women of reproductive age in our republic have a high rate of multiple births, and hystory of anemia plays a key role in this group of patients. The large number of pregnancies, the short intervals between births, long-term lactation, and the number of abortions create unfavorable conditions for the development of iron deficiency anemia in this group of women. Despite on the multiple investigations dedicated to anemia and vitamin-mineral status in pregnancy this problem hasn’t been studied during all the three trimesters in multiparous women. Taking into account the above, iron deficiency anemia and changes in vitamin-mineral status occur frequently among women with multiple births, so it was decided to conduct scientific research on this group of women.

Aim. The study of clinical parameters, hemogram findings, and changes in the level f vitamins and minerals in multiparous women with iron deficiency anemia in all three trimesters of pregnancy. Since multiparous women are common in Azerbaijan, we decided to conduct the research on this group of women.

Materials and methods. The study was conducted on pregnant multiparous women at the II Department of Obstetrics and Gynecology of the Azerbaijan Medical University, based at Maternity hospital No.5 named after Shamama Alasgarova during the period from 2014 to 2022. Group I (control) included 21 healthy non-pregnant women without anemia. There were 30 pregnant women with normal pregnancy (without anemia) in group II, and 80 pregnant women with anemia in group III. Anemiya was diagnosed during pregnancy. In the present article, iron status and vitamin mineral complex were studied in untreated women. Only the iron deficiency type of anemia has been studied. According to the classification given by WHO (2011) experts, grade 1 anemia was defined as a hemoglobin concentration of 100-110 g/l, grade 2 as 70-99 g/l, and grade 3 as <70 g/l. The study included multiparous pregnant women with anemia, but some participants didn’t receive treatment due to refusal of therapy. The study was conducted in accordance with the international ethical standards of the Declaration of Helsinki (WMA, 2013). The study protocol was previously reviewed and approved by the Biomedical Ethics Commitee of Azerbaijan Medical University on July 22, 2022, protocol No.24. During the study, the hemogram test was performed using the "Mythic 18" (Switzerland) hematological analyzer, the serum iron was measured using biochemical chromazurol B (CAB) method with the reagent kit of the company "Human" (Germany) and the serum ferritin was measured by solid-phase enzyme immunoassay (ELISA) method with the reagent kit of the "Pishtaz Teb" (Islamic Republic of Iran) company (Fe-6.6- 26.0 mmol/l, ferritin 20.0-150.0 ng/ml). Folic acid, vitamin B12, and vitamin D were studied according to the solid-phase

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immunoenzyme method (ELISA), (Folic acid-5.0-27.2ng/ml; vitamin B12-197-771pg/ml, vitamin D 30-100 ng/ml). The principle of the method of studying potassium is based on forming a finely dispersed suspension of potassium ions in a protein-free medium with the sodium salt of tetraphenylboron and the potassium salt of tetraphenylboron. For calcium, the principle of the method is based on the formation of a purple complex by calcium ions (Ca^{2+}) with ortho-cresolphthalein in an alkaline medium (8.1-10.4 mg%). The amount of potassium in the blood is directly proportional to the intensity of the color (3.5-5.5 mmol/l). For magnesium, the principle of the method is based on the presence of ethylenediaminetetraacetate in an alkaline environment. Thus, magnesium forms a purple complex compound with xylidyl blue dye (0.8-1.0 mmol/l). The obtained results were processed in the SPSS-26 statistical package with discriminant (chi-square Pearson) and variance (t-Student-Bonferroni) analysis methods and were specified with the non-parametric H-Krskal-Wallis test. In the tables, qualitative data are described in the form of numbers and frequencies, quantitative data in the form of the mean (M, ±m, min, max) and mean structural (Me, Q1, Q3) indicators.

Results. In the conducted study, women were divided into two age groups (18-29 and 30-40 years old) , and women between 30 and 40 years of age were prevalent in all three groups. Thus, 66,7% of the women were in the control group, 56,7% in the comparison group, and 70,0% in the main group, p_H = 0,419. The risk of pregnancy loss was noted in 6 (20,0%) cases in the comparison group and in 36 (45,0%) cases in the main group, p_H = 0,017. Preeclamsia was diagnosed in 6,7 % cases in the comparison group and 23,8 % in the main group, p_H=0,043.

Premature ruptures of membranes was diagnosed in 2 (6,7%) cases in the comparison group and in 41(51,2%) cases in the main group, p_H <0,001. Primary weakness of labor activity was detected in 5 (16,7%) cases in the comparison group, and in 19 (23,8%) cases in the main group, p_H=0,132.

The characteristics of the clinical course of pregnancy are given in table 1.

The evaluation of newborns with the Apgar scale in the first 5 minutes showed 7,9±0,0, Me=8,0 (8,0-8,0) in the comparison group, and 7,7±0,1 Me= 8,0(7,0-8,0) pH = 0,016 in the main group. The birth weight was 3420,0±70,4 Me=3400,0 (3100,0-3600) in the comparison group and 3147,5±64,2 Me =3200,0 (2800,0-3500,0) in the main group p_H =0,029. It can also be noted that although the height indicator differed according to the Student-Bonferroni criterion (p_t=0,036), it was not confirmed by the Kruskal-Wallis criterion (p_H=0,080).

Hemogram indicators were studied in all women included in the study. The results are presented in table 2.

The level of the minerals was also determined. Thus, in the I trimester, the amount of Ca in the control group was 8.7±0.1 Me=8.7(8.5-8.9), in the comparison group - 9.6±0.2 Me=9.7(8.9-10.1), and in the main group 7.6±0.1 Me=7.3(7.1-8.0) P_H<0.001, compared to the control group p<0.001. In the II trimester, this parameter was 9.6±0.3 Me=10.1(9.0-10.2), 7.1±0.1 Me=6.9(6.7-7.3) P_H<0.001, respectively, in the comparison and main groups, compared to the control group p<0.001. In the III trimester, the amount of Ca was 10.0±0.1 Me=10.2(9.8-10.3) and 5.8±0.2 Me=5.4(5.1-6.1) p_H<0.001, respectively, in the comparison and main group, compared to the control group p<0.001.

In the I trimester, the amount of K (potassium) was 4.4±0.1 Me=4.3(4.0-5.0), 4.73±0.19 Me=5.10(3.80-5.20), 3.20±0.06 Me=3.15(3.00-3.30) p_H<0.001, respectively, in the control, comparison, and main groups, compared to the control group p<0.001. In the II trimester, this parameter was 4.50±0.019 Me=4.75(4.35-4.80) and 2.90±0.03 Me=2.90(2.80-3.10), p_H<0.001 in the comparison and main groups, respectively, compared to the control group p<0.001. In the III trimester, the amount of K was 4.32±0.22 Me=4.60(4.00-4.80) and 2.39±0.07 M=2.20(2.10-2.60) p_H<0.001, in the comparison and main groups, respectively, compared to the control group p<0.001.

In the I trimester, the amount of Mg (magnesium) was 0.900±0.012 Me=0.890(0.860-0.940), 0.896±0.014 Me=0.900(0.880-0.930), and 0.755±0.006 Me=0.750(0.730-0.780) p_H<0.001, respectively, in the control, comparison, and in the main groups, compared to the control group p<0.001. In the II trimester, this amount was 0.909±0.032 Me=0.945(0.860-0.970) in the comparison group and 0.683±0.011 Me=0.670(0.630-0.740) in the main group, p_H<0.001, compared to the control group p<0.001. In the III trimester, the amount of Mg was 0.894±0.010 Me=0.880(0.870-0.910) in the comparison group, and

Table 1

Characteristics of the clinical course of pregnancy of the examined women

Indicators	Gradation	Group: Comparison N	Comparison %	Main N	Main %	$p_{\chi 2}$	p_H
Social status	Non-working	24	80.0	61	76.3	0.676	0.677
	Employed women	6	20.0	19	23.8		
Complicated gynecological history	No	28	93.3	75	93.8	0.936	0.937
	There is	2	6.7	5	6.3		
Chronic fetal hypoxia	-	28	93.3	41	51.2	<0.001	<0.001
	+	2	6.7	39	48.8		
Preeclampsia	-	28	93.3	61	76.3	0.042	0.043
	+	2	6.7	19	23.8		
Complicated obstetrics history	-	21	70.0	41	51.2	0.077	0.079
	+	9	30.0	39	48.8		
Delivery	Term	25	83.3	62	77.5	0.503	0.505
	Preterm	5	16.7	18	22.5		
Fetus presentation	Vertex	29	96.7	75	93.8	0.549	0.550
	Breech	1	3.3	5	6.3		
Birth	Physiological	22	73.3	52	65.0	0.407	0.409
	C-section	8	26.7	28	35.0		
Sex	Male	19	63.3	44	55.0	0.431	0.433
	Female	11	36.7	36	45.0		
Rh	Rh (+)	28	93.3	70	87.5	0.382	0.384
	Rh (-)	2	6.7	10	12.5		
Complications of puerperium	-	30	100.0	76	95.0	0.212	0.214
	+	0	0.0	4	5.0		

Note: the statistical reliability of the difference between the indicators of the groups: pχ2 –based on the Chi-square Pearson criterion; PH – based on the Kruskal-Wallis criterion

Table 2

Analysis of hemogram parameters

		Semigroup											P_H
		Control	Comp. – I trim	Comp. - II trim	Comp. - III trim	Main - I trim – I deg. anemia	Main - I trim - II deg. anemia.	Main - II trim - I deg. anem.	Main - II trim – II deg. anemia	Main - III trim - I deg. anem.	Main - III trim - II deg. anem.	Main - III trim - III deg anem.	
Number		21	11	8	11	12	14	7	20	4	20	3	
	M	4.54	4.51	4.71	4.92	3.98	3.58	3.77	3.65	3.85	3.72	2.80	<0.001
RBC	Me	4.50	4.70	4.80	4.90	3.95	3.60	3.80	3.70	3.95	3.75	2.80	
$x10^{12}/L$	Q1	4.20	4.10	4.50	4.80	3.90	3.40	3.70	3.60	3.65	3.60	2.40	
	Q3	4.80	4.80	5.10	5.10	4.05	3.70	3.80	3.80	4.05	3.90	3.20	
	M	43.0	37.2	37.4	38.5	32.5	29.8	33.0	31.0	32.3	30.1	24.5	<0.001
HCT	Me	42.0	37.2	37.5	38.2	32.7	29.4	32.6	31.0	32.2	29.7	24.2	
%	Q1	39.0	36.4	36.6	38.0	32.3	29.1	32.5	30.1	32.0	29.3	24.2	
	Q3	46.0	39.0	39.0	39.0	33.4	30.2	33.6	32.2	32.7	30.3	25.2	
	M	11.8	12.0	12.1	12.3	10.5	9.3	10.1	8.4	10.3	8.9	6.7	<0.001
HCB	Me	11.8	11.9	12.2	12.5	10.5	9.4	10.0	8.4	10.4	8.9	6.9	
g/dl	Q1	11.3	11.9	11.8	11.7	10.4	9.1	10.0	7.8	10.2	8.7	6.3	
	Q3	12.1	12.3	12.4	12.8	10.6	9.7	10.3	8.8	10.4	9.3	6.9	
	M	94.6	83.1	79.9	78.4	81.8	83.5	87.6	85.1	84.4	81.3	89.0	<0.001
MCV	Me	95.2	81.3	80.2	77.6	82.1	83.0	88.4	84.6	82.6	79.9	86.4	
μm^3	Q1	91.1	79.2	74.4	74.5	80.4	81.1	85.5	82.5	80.1	75.4	75.6	
	Q3	97.9	85.9	85.0	81.3	85.2	85.6	90.8	88.1	88.8	85.7	105.0	
	M	26.3	27.0	25.9	25.0	26.4	26.1	26.8	23.0	26.8	24.2	24.2	0.157
MCH	Me	26.3	25.6	25.6	24.9	26.6	26.0	27.0	22.7	26.3	24.7	24.6	
Pg	Q1	24.7	24.6	24.2	23.9	25.4	25.3	26.3	21.4	25.6	22.1	21.6	
	Q3	28.1	29.0	26.9	26.1	27.2	27.4	27.4	23.7	28.1	25.9	26.3	
	M	27.8	32.4	32.4	31.9	32.2	31.2	30.7	27.0	31.8	29.7	27.3	<0.001
MCHC	Me	28.5	32.3	31.8	32.8	32.0	31.4	30.7	26.8	31.8	29.8	28.5	
g/dl	Q1	26.3	31.3	31.4	31.6	31.3	30.2	29.8	24.7	31.1	28.4	25.0	
	Q3	30.0	33.8	33.2	33.3	32.8	32.5	31.6	29.2	32.5	30.4	28.5	
	M	16.5	16.8	16.0	16.5	9.4	8.0	7.7	6.1	8.9	6.8	4.9	<0.001
Fe	Me	16.9	16.8	16.0	16.5	9.3	7.9	7.9	6.2	8.8	7.0	5.3	
mkmol/l	Q1	15.6	16.2	14.7	16.0	9.0	7.7	7.0	5.9	8.4	6.1	3.5	
	Q3	18.7	17.6	17.2	17.0	9.8	8.4	8.0	6.5	9.4	7.2	5.8	
	M	54.4	61.4	62.1	59.3	60.7	66.8	70.4	71.7	65.2	74.7	82.0	<0.001
TIBC Q	Me	54.1	61.4	60.7	59.7	59.8	69.7	71.0	72.7	65.7	75.0	82.1	
mkmol/l	Q1	46.7	53.2	57.7	54.8	54.4	62.5	69.1	69.6	62.9	70.5	79.9	
	Q3	61.2	68.6	67.9	62.8	69.3	70.1	71.9	74.2	67.6	79.8	83.9	
	M	38.0	44.6	46.1	42.8	51.3	58.8	62.7	65.6	56.4	67.9	77.1	<0.001
LIBC Q	Me	35.1	44.3	45.2	44.0	49.9	61.6	62.6	66.3	56.9	68.0	76.4	
mkmol/l	Q1	27.5	37.6	41.7	38.3	44.5	54.2	61.3	63.8	54.3	64.2	76.3	
	Q3	45.9	51.5	50.7	46.6	60.0	62.1	63.9	67.9	58.4	72.6	78.6	
	M	31.4	27.7	25.9	28.1	15.9	12.0	11.0	8.5	13.6	9.1	5.9	<0.001
	Me	29.5	28.0	25.4	27.6	15.7	12.1	11.0	8.6	13.6	9.2	6.3	
TDD	Q1	25.3	24.9	24.2	26.3	13.4	11.3	10.1	8.1	13.2	8.0	4.4	
%	Q3	37.9	30.0	28.0	30.1	17.4	12.4	11.6	8.8	13.9	9.9	7.1	
	M	56.5	19.4	19.8	20.9	27.1	16.9	18.3	10.2	6.7	8.5	4.3	<0.001
Ferritin	Me	60.0	19.3	20.8	19.9	24.5	15.2	20.9	10.2	5.9	9.4	3.0	
ng/ml	Q1	53.0	16.6	17.0	18.5	17.5	10.7	14.2	9.3	4.0	5.8	2.0	

Note: the statistical reliability of the difference between the indicators of the groups: pH – based on the Kruskal-Wallis criterion between 3 groups

0.522±0.025 Me=0.430(0.410-0.670) in the main group, p_H<0.001, compared to the control group p<0.001.

In the I trimester, the amount of FA (folic acid) in the control group was 9.9±0.9 Me=9.9 (5.5-12.6), in the comparison group 8.6±0.5 Me=8.9(7.9-9.8), and in the main group 7.2±0.6 Me=6.4(5.8-7.5) pH=0.025, compared to the control group p<0.001. In the II trimester, the amount of FA was 8.5±0.9 Me=9.4(7.6-10.0) in the comparison group and 5.4±0.2 Me=5.7(5.1-6.0) in the main group, p_H<0.001, compared to the control group p<0.001. In the third trimester, the amount of FA was 11.2±1.3 Me=8.9(8.7-13.4) in the comparison group, and 3.4±0.2 Me=3.2(2.7-4.1) in the main group, pH<0.001, compared to the control group p<0.001.

The amount of vitamin B_{12} in the control group was 486.9±34.9 Me=478.0(367.0-602.0), in the comparison group 388.1±19.6 Me=408.0(296.0-437.0), and in the main group 263.2±23.5 Me=235.0(180.0-325.0) p_H<0.001, compared to the control group p<0.001. In the II trimester, the amount of B_{12} in the comparison group was 365.1±19.9 Me=393.5(339.0-398.0) and in the main group 208.0±7.1 Me=198.0(173.0-233.0), p_H<0.001, compared to the control group p=0.020. In the third trimester, the B12 amount in the comparison group was 351.5±9.6 Me=367.0(330.0-372.0), and in the main group 199.0±5.6

Me=195.0(183.0-207.0) pH<0.001, compared to the control group p<0.001.

In the first trimester, the amount of vitamin D in the control group was 37.7±2.0 Me=34.0(31.0-43.0), 38.3±2.9 Me=40.6(32.6-44, 7) and in the main group, it was 26.3±0.8 Me=26.4(24.3-29.0) p_H<0.001, compared to the control group p<0.001. In the II trimester, vitamin D level was 32.7±2.4 Me=35.6(29.6-36.6) in the comparison group and 22.7±1.0 Me=21.3(18.9-25.2) in the main group, p_H<0.001, compared to the control group p<0.001. In the III trimester, the vitamin D amount was 30.1±1.6 Me=32.7(28.1-33.4) in the comparison group and 14.2±0.4 Me=13.5(12.9-15.6) p_H<0.001 in the control group, compared to the control group p<0.001.

Discussion. During pregnancy, a serious change in iron metabolism occurs in iron deficiency anemia. In this regard, the study of the vitamin and mineral complex and their correlation with clinical indicators was of great importance in our research.

Bakhareva's study noted a high percentage of the risk of pregnancy loss, in 15 (50%) cases[2]. In our study, the risk of miscarriage was observed in 36 (45,0%) cases. During pegnancy, a woman's body consumes significantly more macro- and microelements; thus, the micronutrients required to ensure the normal life activity of a pregnant woman's body are the most important factor in ensuring the physiological course of pregnancy and the normal growth of the fetus, Due to the deficiency state, the progress of pregnancy and childbirth becomes complicated, so the risk of placenta formation disorders and perinatal pathology increases, leading to premature birth, birth defects, early neonatal adaptation disorders, deviations in the formation of the infant's mental and physical development in the postnatal ontogeny stage. The most common problem among this group of patients is a lack of iron supply, which leads to iron deficiency anemia. Chronic fetal hypoxia occurred in 43 (0,8%), and fetal growth restriction occurred in 183 (3,4%) cases [1]. In our study, chronic fetal hypoxia occurred in 39 (48,8%) p<0,001 cases, and fetal growth restriction occurred in 6 (7,5%) cases.

According to the global assessment, anemia was found in 42% of pregnant women and 30% of non-pregnant women [17].

Controversial claims that folic acid intake prevents fetal neural tube defects are well known and play an important role in reproductive health [13]. During our research, no fetal neural tube diseases were found. Vitamin B12 and folate are involved in the carbon metabolism cycle and govern fetal growth [5].

According to WHO recommendations, daily intake of folic acid and iron as part of prenatal care reduces the risk of low birth weight, anemia, and iron deficiency in the mother [12]. Micronutrient, vitamin, and mineral deficiencies are critical for health and can be caused by a poor diet or disease [14]. During the study, the existence of a pathological condition in the first trimester of pregnancy, as well as an aversion to meals, resulted in vitamin and mineral deficiencies. Magnesium is one of the ten essential metals in humans, it is the fourth most abundant cation after calcium, potassium, and sodium, and it dominates being the second most abundant intracellular cation in human tissues [7]. In the course of the study, multiparous women with iron-deficiency anemia were found to be seriously deficient in magnesium. Pregnancy is a risk factor for leg cramps. About 30% to 50% of pregnant women experience leg cramps twice a week during the third trimester [11]. Among the pregnant women, signs of calcium deficiency were assessed in the main group, including general weakness, leg cramps and other related symptoms.

Vitamin D is a fat-soluble vitamin, a steroid hormone, synthesized primarily in the skin under the influence of ultraviolet sunlight [4]. Vitamin D is globally associated with maternal, fetal, and infant health in relation to pregnancy-related complications (preeclampsia and gestational diabetes), preterm birth, and infant-related outcomes. A meta-analysis of observational data and trials of vitamin D supplementation, in particular, provided evidence of beneficial effects of vitamin D on fetal weight and size and reduced risk of small-for-gestational-age birth [9]. Vitamin D is primarily involved in bone metabolism, and its deficiency is known to cause osteoporosis [16]. Despitie the fact that Azerbaijan due to its geographical location is characterized by high levels of solar activity neverhteless, the surveyed women suffer from vitamin D deviciency which adversely affects their quality of life.

Conclusion. Thus, the research revealed that multiparous women constitute a high-risk group in our republic. İn our study clinical characteristics and laboratory findings were reflected. İn the course of our study, clinical signs and laboratory data indicated a significant deficiency in hematological parameters and vitamin-mineral complex levels. These changes were statistically significant and became more pronounced as gestational age increased wtih the most marked alterations observed in third trimesteer. The study of vitamins and microelements allows to prescribe appropriate drug treatments for anemia. It is appropriate to prescribe vitamin and mineral complex drugs containing vitamin B12, vitamin C, folic acid, Ca, and vitamin D along with iron preparations.

The authors declare no conflict of interest in the submitted article.

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THE EFFECT OF GESTATIONAL AGE ON THE DEVELOPMENT OF NECROTIZING ENTEROCOLITIS

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Over the past 10 years, 208 children with necrotizing enterocolitis (NEC) have received our treatment. The control group consisted of 50 children whose gestational age was approximately similar to the main group. A case-control study was conducted to determine the role of the influence of gestational age on the development of NEC. 89 (42.8%) children with NEC and gestational age from 30 to 36 weeks had significantly lower percentiles of birth weight, umbilical cord pH, and a 1-minute Apgar score compared with 22 children from the control group of the same gestational age. On the contrary, there were no significant differences between 98 (47.1%) children with NEC and the control group (n= 24) aged 25-29 weeks, except that a small number of children with NEC received breast milk. 21 full-term infants in the main group and 5 infants in the control group appeared to have an obvious predisposing factor. The study proved that the predisposition to NEC depends on the gestational age. In the range of 25-29 weeks, all babies are at risk due to extreme prematurity. In the range of 30-36 weeks, asphyxia and children with stunted growth are at increased risk, while at full term, serious predisposing factors are apparently required.

Keywords: necrotizing enterocolitis, risk factors, gestational age.

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Introduction. Necrotizing enterocolitis (NEC) remains a severe and life-threatening disease that occurs in the neonatal period. In the USA in 2017, 9.9% of newborns were born before 37 weeks of gestational age, which are classified as premature [1]. Necrotizing enterocolitis is usually manifested by bloody stools, food intolerance, and a swollen, painful stomach. Necrotizing enterocolitis is the most common indication for urgent surgical intervention in premature infants. Complications of necrotizing enterocolitis of newborns include intestinal perforation with pneumoperitoneum, abdominal abscess, strictures, short bowel syndrome, septicemia, and death. Despite widespread numerous scientific and practical investigations, the etiology of the disease has not yet been definitively clarified. Some research groups believe that prematurity is almost the only perinatal factor in the development of NEC [2]. At the same time, in other studies that identify other risk factors for NEC, the risk of prematurity is not considered as the main factor of this disease. Hyaline membrane diseases are more common among NEC patients, but it is quite common among the control group of the examined patients [3]. Some authors point out that asphyxia is more common in patients with NEC [4] and usually umbilical vein catheterization is often performed in this category of patients [5]. The presence of such differences seems to underlie the differences among the surveyed population. Back in the 80s of the 20th century, a group of researchers did not detect NEC among the examined premature infants (body weight <1500-1750 gy); however, when analyzing the results of the examination of all newborns, the frequency of NEC detection increased[6].

Warner B.B., et all. in their studies indicate that risk factors for the development of necrotizing enterocolitis vary with birth weight [7]. The risk factors with the greatest prognostic significance are birth weight less than 1500 g, gestational age from 28 to 32 weeks, Apgar scores less than 3 points at birth [8].

An analysis of the literature data suggests that birth weight and gestational age are, to varying degrees, risk factors for the development of NEC [9]. In these case-control studies (retrospective comparison of two groups), comparison of birth weight was most often significant [10]. In one study that controlled for gestational age, only 23 patients had "late onset" NEC. Another group of researchers in their recent reports have provided new information on the etiology of NEC, demonstrating a very significant relationship between the absence or inverse end-diastolic flow velocity (AREDF) curves in the umbilical artery or fetal aorta and the subsequent development of NEC [11].

For the first time, a subgroup of preterm infants has been identified that

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