

# The Role of Indicators of Ferrokinetics and Endogenous Erythropoietin in Anemia of Pregnant Women

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**Abstract** To study the parameters of ferrokinetics in the dynamics of pregnancy, taking into account the severity of anemia For the period from 2017-2019. We examined 90 pregnant women with anemia, 50 of them were untreated, received in the maternity ward with a kind of activity, and 40 were treated in the department of pathology of ward with a kind of activity, and 40 were treated in the department of pathology of pregnant women. The control group consisted of 40 conditionally healthy pregnant women. Under our supervision and examination, there were 40 pregnant women with anemia, aged 17–35 ( $28 \pm 0.1$ ) years, who were registered in female consultations and were treated in the department of pathology of pregnant urban maternity complex No. 1. Bukhara.

**Keywords** Iron deficiency anemia, Ferrokinetics, Erythropoietin

## 1. Introduction

The main criteria for IDA are a decrease in the level of hemoglobin and a color index reflecting the hemoglobin content in the erythrocyte. Morphologically determined hypochromia, erythrocytes, microcytosis, anisocytosis and poikilocytosis. The content of reticulocytes in the blood, as a rule, remains within the normal range. An important diagnostic value is a decrease in the level of serum gland and ferritin and an increase above the standard values of transferrin and the total iron binding capacity of the serum. Recently, the importance of determining the level of transferrin receptors in blood plasma, which is a sensitive indicator of the degree of tissue iron deficiency. According to the WHO recommendation, the lower limit of normal hemoglobin concentration for a pregnant woman is reduced to 110 g / l (outside pregnancy - 120 g / l), hematocrit - to 33% (non-pregnant - 36%). Laboratory criteria: In addition to hemoglobin (Hb), as a parameter of the functional fund, other hematological parameters are determined: red blood cell count (RBC) and hematocrit (Ht). The reserve fund is estimated by the level of serum ferritin (SF), and iron – regulatory - by erythrokinetic indicators: erythropoietin (EPO) and the coefficient of adequacy of EPO products.

Severe anemia is the main cause and starting mechanism for the development of complications leading to maternal mortality and perinatal pathology. Among the deceased mothers, IDA is observed, mostly moderate (20%), severe

(60%) and extremely severe (20%). A large proportion of deceased males with moderate and severe anemia (55.7%) was noted, in which pregnancy and childbirth in 7% of cases were complicated by pathological blood loss.

Pregnant women suffering from severe anemia, the risk of childbirth increases with decreasing hemoglobin and increased hypoxia of organs and tissues due to the development of profuse, hypo- and atonic bleeding, severe coagulopathy and postpartum septic diseases. The frequency of detection of IDA during pregnancy depends on the three-mestria. So, in the first trimester, it is rare, in 25% of cases. In the second trimester, IDA is detected in 60% of cases, more often after the 25th week of pregnancy. In trimester III, IDA occurs in 80% of pregnant women.

Normal hemoglobin levels do not always indicate a sufficient supply of iron in the body. Even in the absence of a decrease in hemoglobin, erythrocyte and hematocrit, there may be signs of adrenal or latent iron deficiency. 40-60% of women of childbearing age, even before pregnancy, there is a deficiency of this trace element. The presence of IDA, especially before the onset of gestation, significantly increases perinatal morbidity and mortality, fetal growth retardation syndrome is observed in 32% of cases, hypoxic brain injury is bad - 40%. The combination of IDA and placental insufficiency complicates the gestational process in 20-40% of cases. The aim of the study was to improve the quality of medical care for pregnant women by improving the methods of treating anemia and preventing complications of childbirth.

## 2. Research Objectives

To study the parameters of ferrokinetics in the dynamics

of pregnancy, taking into account the severity of anemia.

### 3. Materials and Methods

For the period from 2017-2019. We examined 90 pregnant women with anemia, 50 of them were untreated, received in the maternity ward with a kind of activity, and 40 were treated in the department of pathology of pregnant women. The control group consisted of 40 conditionally healthy pregnant women. Under our supervision and examination, there were 40 pregnant women with anemia, aged 17–35 ( $28 \pm 0.1$ ) years, who were registered in female consultations and were treated in the department of pathology of pregnant urban maternity complex No. 1. Bukhara.

Hemoglobin content 95 g / l and below, serum iron 15  $\mu\text{mol}$  / l and below, gestational age of 20 weeks or more, and absence of other blood diseases were the criteria for selection of pregnant women into groups.

The main complaints of pregnant women with anemia were general weakness, fatigue, shortness of breath with mild physical exertion, flickering of "flies" before the eyes, dizziness, nasal hemorrhages, sleep disorders and mood for no apparent reason, decreased appetite, memory loss.

Depending on the type of antianemic therapy, the patients were divided into 2 groups: the comparison group — 18 pregnant women — received ferron 100 mg, 1-2 capsules daily for 2-3 months, until normal hemoglobin level in the blood was reached; the main group - 22 pregnant women, received ferron 100 mg 1-2 capsules daily for 2-3 months, until normal hemoglobin level in blood and REPO 2000 MED are achieved subcutaneously after 3 days 2-3 injections depending on the severity anemia. The distribution of pregnant women, depending on the severity of anemia, is presented in table 1.

**Table 1.** Distribution of pregnant women depending on the severity of anemia (M  $\pm$  m)

The degree of anemia (Hb g / l)	The main group (n = 22)		Comparison Group (n = 18)	
	Aбс	%	Aбс	%
Lightweight (110 - 91)	7	32	6	33,3
Moderate (90 –71)	10	45	9	50
	5	23	3	16.7

Age characteristics of the examined women are presented in tab 2.

**Table 2.** Age characteristics of women examined

Age years	The main group (n = 22) Основная группа (n=22)		Comparison Group (n = 18) Группа сравнения (n=18)	
	Aбс	%	Aбс	%
17-20	8	36.4	6	33.3
21-35	14	63.6	12	66.7

The data in the table show that women of the compared groups were mainly in the age range of 21-30 years (40%), characterized as active reproductive age. Young women and women of late reproductive age in all the examined groups had the minimum number, with the exception of infants from the main group, in which young pregnant women accounted for 23.8%, older women 3.2%.

Among the examined in the groups, recurrent and multiparous women with a second or third pregnancy, which did not differ in significantly significant limits, prevailed. In the obstetric and gynecological history, women had: honey. abortion - 13 women (15.6%), spontaneous miscarriages - 8 women (9.6%), non-developing pregnancy - 4 women (4.8), antenatal fetal death - 3 (3.6).

**Table 3.** Outcomes of previous pregnancies in surveyed women

Outcomes of Past Pregnancies	Pregnant groups			
	I comparison group (n = 18)		II group main (n = 22)	
	Aбс	%	Aбс	%
Medical abortion	2	11.1	4	18
Spontaneous miscarriages	1	5.6	2	9
Non-developing pregnancy	2	11.1	2	9
Antenatal fetal death	7	38.9	1	4.5

**Table 4.** Extragenital diseases in the history of the examined women

Pregnancy	Extragenital diseases			
	Comparison group (n = 18)		Basic group (n = 22)	
	Aбс	%	aбс	%
Respiratory diseases:				
Chronic. Tonsillitis	1	5.6	1	4.5
Chronic. Sinusitis			1	4.5
Chronic. Bronchitis				
ARVI	8	44.4	10	45.4
CCC diseases:				
Hypertonic disease	1	5.6	1	4.5
Vegetative-vascular dystonia				
Varicose veins	1	5.6	1	4.5
Kidney disease				
Chronic pyelonephritis				
Blood diseases:				
Anemia	18	100	22	100
Gastrointestinal Disorders:				
Gastritis, colitis			1	4.5
Chronic. Hepatitis				
Metabolic pathology:				
Thyroid disease	3	16.7	9	41
Obesity	1	5.6	1	4.5
Diabetes				

The health index of the examined women, taking into account the presence of extra-traumatic diseases, was

relatively satisfactory. As can be seen from table 4, ARVI and anemia occupied the leading place in all groups, the remaining extragenital diseases were found in a small number of patients.

**Table 5.** A history of gynecological diseases in pregnant women with IDA

Gynecological diseases Abs% abs% Uterine fibroids 1 5.6 1 4.5 Chronic adnexitis 1 5.6 1 4.5	Pregnant groups			
	Comparison group (n = 18)		Basic group (n = 22)	
	Aбс	%	Aбс	%
Uterine fibroids				
Chronic adnexitis	1	5.6	1	4.5
Chronic metroendometritis				
Colpit				
Chronic adnexitis	1	5.6	1	4.5
Chronic metroendometritis	2	11.1	1	4.5
Colpit	1	5.6	2	9
Cervical erosion Endometriosis	2	11.1	2	9
Infertility			1	4.5
Menstrual irregularities	1	5.6	1	4.5
Endometriosis				
Cervical insufficiency				

The postponed gynecological diseases were registered in 17 women (42.5%), 23 women did not indicate a gynecological pathology in the past.

The contingent of pregnant women was subjected to a thorough clinical and laboratory research. The clinical examination included a study of complaints, life, obstetric and gynecological anamnesis, taking into account the diseases suffered before and during this pregnancy. A general and special obstetric study was conducted: external palpation, auscultation of the fetus, examination in the mirrors with a prenatal rupture of the membranes and discharge of water, vaginal examination, determination of the degree of cervical dilatation. The mothers underwent a general analysis of blood, urine, discharge from the cervical canal, vagina, urethra. The group and Rh affiliation of the blood, the blood test for HBsAg, RW, by agreement of the woman to HIV / AIDS were determined. Some biochemical parameters of peripheral blood were also determined: total protein, ALT, AST, coagulogram. According to the testimony conducted tests on Zimnitsky, Nechiporenko, ECG was taken. The localization of the placenta and the size of the fetus were determined by ultrasound. All pregnant women are consulted by the therapist. The diagnosis of IDA was set on the basis of complaints, anamnestic data and clinical data, as well as the content of HB, erythrocytes, color index and indicators of iron metabolism (serum iron, OZHSS and ferritin). The severity of anemia was assessed by the WHO classification (1999) (Table 6).

Quantitative determination of hemoglobin in the blood was carried out with such hemoglobin cyanide method, and a method was used to determine the concentration of iron in the blood serum, and the determination of ferritin in the blood serum. The results obtained for the iron metabolism

indicators of the examined pregnant women indicated that anemia in the examined pregnant women was jellied. Deficiency of iron in the depot and serum progressed as the severity of anemia and gestational period increased, which indicates an increased need for the maternal organism.

**Table 6.** Classification of anemia by severity

Severity	Hemoglobin (g / l) (r/n)	Red blood cells (10x12 / l)
I – light	110 – 91	3,6 - 3,2
II – medium	90 – 71	3,2 - 3,0
III – heavy	70 and below	3,0 – 1,5

Therapy REPO has proven to be an effective and safe method of treating iron therapy, resistant to ferrotherapy. Hb level <90 g / l and non-efficacy of ferrotherapy for 2-4 weeks are sufficient indications for initiating REPO therapy. The treatment of IDA in pregnant women was carried out to a HB level of 110-120 g / l and then switched to a prophylactic dose of iron - 30 mg / day per os until the end of pregnancy.

## 4. Conclusions

It was established that the progression of mild anemia in every second, the development of PE and prenatal discharge of water in every third was a distinctive feature of the course of pregnancy. Births were often complicated by bleeding during pregnancy (PONRP - 6.3%) and after delivery (13.5%) and injuries of the soft birth canal (70%). Syndrome of delayed fetal development and the birth of low-weight babies was observed in 30% of patients.

The findings showed that anemia is a high risk factor for the development of pregnancy complications and rhodes, which dictated the need to optimize complex therapies for pathology throughout the entire gestation period, which will prevent complicated pregnancy and childbirth and will be one of the antenatal measures fetal protection.

A study of ferrokinetics in the dynamics of pregnancy has shown that anemia is iron deficient, with the degree of reduction of iron content, KNTZh and ferritin and increase of transferrin level depends on the severity of the disease. Treatment of IDA with iron-containing drugs only is not effective enough. Hb level <90g / l and resistance of anemia to treatment with Fe preparations is an indication for REPO therapy, especially when preparing for delivery.

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