

E. S. Mikhaylin\*<sup>1,2</sup>, L. A. Ivanova<sup>1,2</sup>, A. G. Savitsky<sup>1</sup>,  
M. M. Shilo<sup>1</sup>, I. V. Berlev<sup>1</sup>

<sup>1</sup>— North-Western State Medical University named after I. I. Mechnikov, St. Petersburg, Russia

<sup>2</sup>— Maternity hospital No. 10, St. Petersburg, Russia

## NEW METHOD OF PREVENTION OF IRON-DEFENSE ANEMIA IN PREGNANT TEENS

### Abstract

The paper presents an assessment of the effectiveness of the method proposed by the authors for the prevention of iron deficiency anemia in pregnant minors. At the first stage of the study, 593 labor and delivery records were retrospectively analyzed (Group 1: minors between the ages of 13–15 (n = 49), Group 2: minors between the ages of 16–17 (n = 434), Group 3: women of average reproductive age (n = 110)). At the second stage, the incidence rate and development of anemia in pregnant women were prospectively analyzed (Group 1: minors between the ages of 13–15 (n = 49), Group 2: minors between the ages of 16–17 (n = 434), Group 3: women of average reproductive age (n = 110)). At the third stage, pregnant minors were divided into two groups: in the 1<sup>st</sup> (main) group (n = 144), iron deficiency anemia was prevented using the proposed method; in the 2<sup>nd</sup> (experimental) group, the traditional therapy with iron supplements was carried out after the onset of clinical and laboratory signs of anemia. The essence of the proposed method is that a pregnant minor woman is examined for ferritin in venous blood with the absence of laboratory signs of anemia, and at a value below 35 ng/ml, oral iron supplements are prescribed in conventional preventive doses for a period of 3 months, and if in three months the content of ferritin in the venous blood is again below 35 ng/ml, the intake of iron supplements continues for another 3 months. The use of the proposed method contributed to a significant decrease in the incidence of anemia in pregnant minors. The proposed method of preventing iron deficiency anemia in pregnant minors helps to reduce the incidence and severity of anemia in this complex category of patients.

**Key words:** anemia of pregnant women, iron deficiency anemia, ferritin, pregnancy in minors

**For citation:** Mikhaylin E. S., Ivanova L. A., Savitsky A. G., Shilo M. M., Berlev I. V. NEW METHOD OF PREVENTION OF IRON-DEFENSE ANEMIA IN PREGNANT TEENS. The Russian Archives of Internal Medicine. 2018; 8(2): 123–126. [In Russian]. DOI: 10.20514/2226-6704-2018-8-2-123-126

DOI: 10.20514/2226-6704-2018-8-2-123-126

### Introduction

The incidence rate of anemia of pregnant minors exceeds that in women of average reproductive age. According to the literature, it can reach 30–40% [1]. It is argued that the main cause of anemia in minors is malnutrition [2]. Despite the fact that malnutrition is usually associated with a low socio-economic standard of living, the incidence rate of anemia in minors does not tend to decrease in both developing and developed countries [3]. Anemia is

accompanied by dystrophic processes in myometrium and placenta, which lead to its hypoplasia and a reduction in hormone levels [4]. It was shown that anemia during pregnancy is associated with various pregnancy complications (pre-eclampsia, placental abnormalities, small for gestational age fetus), birth complications (preterm birth, weak uterine contractions, hypotonic hemorrhage) and complications during the postpartum period (purulent-septic complications) [5, 6]. The well-known method of anemia treatment in pregnant

\* Contacts. E-mail:

women is to prescribe oral iron supplements if there are clinical and laboratory signs of anemia. If the patient suffers from severe anemia, iron infusion is conducted (if anemia is confirmed as iron deficiency anemia).

The important role of subclinical iron deficiency anemia in pregnant minors has been noted since the presence of clinical and laboratory signs of anemia are preceded by absence of iron stores in the human body [4]. The late detection and treatment is fraught with severe complications, which always decompensate in minors suddenly.

The proposed method is aimed at preventing iron deficiency anemia in pregnant minors without waiting for clinic or laboratory signs of anemia. The method helps to avoid dystrophic processes in placenta, placental insufficiency, small for gestational age fetus, and thus avoiding preterm birth and low birth weight babies with a low Apgar score.

**The objective of this work** was to evaluate the effectiveness of a new method for iron deficiency anemia prevention in pregnant minors.

## Materials and Methods

During the first stage, 593 labor and delivery records were retrospectively analyzed (where group 1 consisted of minors between the ages of 13–15 ( $n = 49$ ), group 2 consisted of minors between the ages of 16–17 ( $n = 434$ ), and group 3 consisted of women of average reproductive age ( $n = 110$ )).

During the second stage, the incidence rate and development of anemia in pregnant women were prospectively analyzed (where group 1 consisted of minors between the ages of 13–15 ( $n = 17$ ), group 2 consisted of minors between the ages of 16–17 ( $n = 127$ ), and group 3 consisted of women of average reproductive age ( $n = 110$ )).

During the third stage, pregnant minors were divided into two groups: in the 1<sup>st</sup> (main) group ( $n = 144$ ), iron deficiency anemia was prevented using the proposed method; in the 2<sup>nd</sup> (experimental) group, the traditional therapy with iron supplements was carried out after the onset of clinical and laboratory signs of anemia.

The essence of the proposed prevention method is as follows: when they are admitted for prenatal care, all pregnant minors are examined for

ferritin in venous blood. When a ferritin value in venous blood was recorded as being below 35 ng/ml (having normal RBC, hemoglobin and hematocrit level), oral iron supplements (iron protein succinylate + calcium folinate) were administered in preventive doses (in accordance with the Instruction for Use) for a period of 3 months. After three months, a check analysis on the ferritin content in venous blood is performed. When the ferritin value in venous blood falls below 35 ng/ml (having normal RBC, hemoglobin and hematocrit level), the oral iron supplement continues to be administered (in the conventional preventive dose according to the Instruction for Use) for three extra months. A patent on the invention “A Method for Preventing Iron Deficiency Anemia in Minor Pregnant Women” has been obtained (Patent of the Russian Federation No. 2616264 dated 13/4/2017) [7].

The statistical analysis was performed using the software STATISTICA v.7.0 (Statsoft Inc., Tulsa, USA).

## Results

In the first stage of the present study, it was found that the incidence rate of chronic anemia existing before pregnancy was 2 (2.0%) in minors between the ages of 13–15, 19 (4.3%) in minors between the ages of 16–17, and 4 (3.6%) in women of average reproductive age ( $p > 0.05$ ).

Anemia in pregnant women was observed in minors between the ages of 13–15 2.0 times more often (16 – 32.7%) ( $p < 0.05$ ), and in minors between the ages of 16–17 1.8 times more often (129 – 29.7%) ( $p < 0.01$ ) than in women of average reproductive age (18 – 16.4%).

Wherein mild anemia was observed in minors between the ages of 13–15 2.1 times more often (12 – 24.5%) ( $p < 0.01$ ), and in minors between the ages of 16–17 2.2 times more often (112 – 25.8%) ( $p < 0.01$ ) than in women of average reproductive age (13 – 11.8%).

Moderate anemia was observed in minors between the ages of 13–15 1.1 times more often (2 – 4.1%) ( $p > 0.05$ ), and in minors between the ages of 16–17 1.4 times less often (11 – 5.2%) ( $p > 0.05$ ) than in women of average reproductive age (4 – 3.6%).

**Table 1.** Anemia patterns in pregnant women, abs. (%)

Anemia	Groups		
	Age 13–15 n = 17	Age 16–17 n = 127	Women of average reproductive age n = 110
Anemia of pregnant women:	4 (23.5)	28 (22.0)	18 (16.4)
– iron-deficiency anemia	4 (23.5)	25 (19.7)	16 (14.5)
– B <sub>12</sub> -deficiency anemia	0	1 (0.8)	1 (0.9)
– others	0	2 (1.6)	1 (0.9)

Note: \* —  $p_{2-5} < 0.1$ .

**Table 2.** Evaluation of the effectiveness of the proposed method for iron deficiency anemia prevention, abs. (%)

Anemia	Groups	
	Main group n = 144	Experimental group n = 339
Anemia of pregnant women:	32 (22.2)	113 (33.3)*
– mild	29 (20.1)	95 (28.0)*
– moderate	3 (2.1)	10 (2.9)
– severe	0	8 (2.4)*

Note: \* —  $p < 0.05$ .

There was a tendency ( $p < 0.01$ ) to observe an increased incidence rate of severe anemia in minors between the ages of 13–15 (2 – 4.1%) compared with women of average reproductive age (1 – 0.9%). The incidence rate of severe anemia in minors between the ages of 16–17 was 6 (1.4%).

The results of the study of the incidence rate and anemia patterns in pregnant women in the II (prospective) stage of this study are presented in Table 1.

Anemia during pregnancy was observed in minors between the ages of 13–15 1.4 times more often ( $p > 0.05$ ), and in minors between the ages of 16–17 1.3 times more often ( $p < 0.1$ ) than in women of average reproductive age. About 90% of the total number of cases of anemia during pregnancy in all groups was iron deficiency anemia.

The evaluation of the effectiveness of the proposed method for iron deficiency anemia prevention is presented in Table 2.

Anemia during pregnancy was recorded 1.5 times less often ( $p < 0.05$ ) in minors who underwent anemia prevention in accordance with the proposed method. The absence of severe anemia in this group should be noted.

## Results and Discussion

As the results of the study showed, the rate of incidence of anemia during pregnancy in minors exceeds that in women of average reproductive age, which is consistent with data from the literature [8, 9, 10]. The probable reason is that the body of a pregnant minor is still growing, and the need for iron during pregnancy increases to a much greater extent than in a woman of average reproductive age since a minor needs iron both for her own growth, which is not the case for women of average reproductive age, and for the growth and development of the fetus. Therefore, we assume that one of the key principles of prenatal care for minors is anemia prevention. This study discusses anemia as a pregnancy complication, and it does not concern chronic anemia that may exist before pregnancy.

It should be noted that the decrease in the incidence rate and severity of anemia in pregnant women in cases where anemia prevention was carried out according to the proposed method was due to a decrease in the incidence rate of iron deficiency anemia, which accounts for more than 90% of the total number of cases of anemia in pregnant

women according to our data. The incidence rate of other types of anemia (particularly, pernicious anemia) apparently did not change.

## Conclusion

The proposed method for iron deficiency anemia prevention in pregnant minors helps to reduce the incidence rate and severity of anemia in this complex patient population.

## Conflict of Interests

The authors declare no conflict of interests.

## References:

1. Gurkin Yu.A., Susloparov L.A. Fundamentals of juvenile obstetrics. St. Petersburg.: Folio. 2005; 352 p. [in Russian].
2. Hertrampf E., Olivares M., Letelier A. Situacion de la nutricion de hierro en la embarazada adolescente al inicio de la gestation. Revista Medica de Chile. 1994; 122(12): 1372-1377.
3. Klerman L.V. Adolescent pregnancy and parenting: controversies of the past and lessons for the future. Journal of Adolescent Health. 1993; 14(7): 553-561.
4. Joshi M., Gumashta R. Weekly iron folate supplementation in adolescent girls — an effective nutritional measure for the management of iron deficiency anaemia. Glob. J. Health Sci. 2013; 5, (3): 188-194.
5. Mirov I.M., Usacheva O.A., Shevlyakova T.V. Actual issues of public health in the center of Russia: a collection of scientific papers of the RyazGMU. Ryazan. 2002; 2: 59-63. [in Russian].
6. Shadchneva E.V. Features of the course of pregnancy and childbirth in adolescents: avtoref. dis. ... cand. med. sciences. M. 2006; 20 p. [in Russian].
7. A method for preventing iron deficiency anemia in minor pregnant women: RF patent No. 2616264 / E.S. Mikhaylin, L.A. Ivanova, A.G. Savitsky, P.N. Krotin, I.V. Berlev, application number 2016111426 dated March 28, 2016, publ. 13.04.17, Bul. № 11. [in Russian].
8. Bryukhina E.V. Pregnancy and childbirth in adolescent girls. Prevention of complications, rehabilitation: avtoref.. diss. ... doc. med. sciences. Chelyabinsk. 1997; 40 p. [in Russian].
9. Laryusheva T.M., Istomina N.G., Baranov A.N. Comparative characteristics of clinical indicators of pregnancy and childbirth in adolescent women and women of optimal biological age. Journal of Obstetrics and Women's Diseases. 2016; LXV (1): 34-42. [in Russian].
10. Barinov S.V., Shamina I.V., Tirskaia Yu.I. et al. The course of pregnancy and outcomes of childbirth in the age aspect. Fundamental and clinical medicine. 2016; 1, (2): 18-24. [in Russian].



Article received on 19.02.2018

Accepted for publication on 26.02.2018