Statistical analysis of anemia during pregnancy and childbirth in Transcarpathia

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Introduction
Worldwide, about 41.8% of pregnant women suffer from anemia. About half of them have iron deficiency, and other causes of anemia are deficiency of folic acid, vitamin B12 and vitamin A, chronic inflammation, parasitic infections and some hereditary diseases (WHO, 2012). The prevalence of anemia in pregnancy varies from 18% in developed countries and 75% in countries of South Asia (Wang, An, Cochran, 2002). In the countries of Western and Central Africa, more

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A B S T R A C T
The aim is to evaluate the frequency of anemia during pregnancy and childbirth in different districts of the Transcarpathian region in 2014 and compare this data with the parameters of 2012 and 2013 years. Materials and methods: It was a retrospective analysis of medical records of Transcarpathian region. Data of annual reports of medical care for pregnant women, women and mothers during 2014 in different districts of Transcarpathian region and frequency rates of anemia during pregnancy and childbirth for Transcarpathian region in 2012 and 2013 years were evaluated. Conclusion: 1. In Svaliava district with the lowest index of pregnancies per 1000 of the population (10.3) the highest frequency of anemia during pregnancy and the lowest during delivery was observed, that testifies on one hand about the poor prevention of anemia in the region, and on the other – about effective treatment of anemia in pregnant women. 2. In three districts (Perechyn, Mukachevo, Khust) a slight increase in the frequency of anemia in childbirth was observed compared with the frequency of this disease during pregnancy, but this data was statistically improbable. 3. Due to the fact that the frequency of anemia in pregnancy during the period from 2012 to 2014 remained almost unchanged special attention should be payed to the prevention of this disease. 4. A statistically significant reduction of frequency of anemia in childbirth compared with frequency of anemia during pregnancy in lowland and mountain areas in Transcarpathia (p<0,05) is noted, and these parameters are almost identical.


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than half of the girls aged 15-19 suffer from anemia. This is a big problem for these countries, because there are frequent teenage marriages, and consequently adolescent pregnancies (UNICEF, 2011). Iron deficiency has many negative effects on both mother and child.

First of all, iron deficiency in women of childbearing age increased maternal mortality (WHO, 2001). Twenty percent of all maternal deaths were associated with anemia (Micronutrient deficiencies iron deficiency anaemia, from http://www.who.int/nutrition/topics/ida/en/index.html/).

There are three main negative effects on the mother: 1. Reduction of physical performance is observed (Joint FAO/WHO, 1998). 2. Obstetrical bleedings in pregnant women with anemia is more common (Nwizu, Iliyasu, Ibrahim et al., 2011). There is evidence of a link between iron deficiency in maternal and placental abruption, that is why the loss of prenatal and postnatal blood increases (Pavord, Myers, Robinson et al., 2012). 3. In pregnant women with anemia, postnatal infections are more often observed, this in particular is a problem in developing countries (Nwizu, Iliyasu, Ibrahim et al., 2011). The increase in infectious diseases in people with iron deficiency is associated with the negative impact of this deficiency on the immune system. Thus the ability of white blood cells to kill bacteria decreases, and the capability of replication of lymphocytes also decreases during mitogen stimulation. Also, there is a decrease in the concentration of cells that are responsible for cellular immunity (WHO, 2001).

Secondly, the most negative impact on the child with an iron deficiency is associated with reduced delivery of oxygen to the fetus that hinders its normal fetal development, increases the frequency of stillbirths, neonatal mortality and low birth weight (Bhawan, 2013). It was established that about 20 million children are born weighing less than 2500 grams, 15 million are born prematurely. Even more children are born with insufficient weight for their gestational age, and it increases the risk of morbidity and mortality in childhood (WHO Headquarters, 2015).

Favorable results of pregnancy and childbirth in mothers with anemia is observed in less than 30-45% of cases. Their children also have iron deficiency - less than half of normal amount of iron. About 30-80% of children under 1 year are anemic in developing countries (WHO, 2001). Iron deficiency can lead to brain hormone imbalance, especially the monoamine oxidase system, that manifests violation of cognitive function and other disorders of the central nervous system (Sharman, 2000).

Iron deficiency also affects the production of other hormones in our body, including triiodothyronine (T3), Catecholamines, and other neurotransmitters. This leads to the reduction of heat production in the body and endurance to cold temperatures (WHO, 2001).

Iron deficiency also increases the risk of heavy metal poisoning in children. Uptake of divalent heavy metals is increased, such as lead and cadmium (WHO, 2001). For the diagnosis of anemia, the level of hemoglobin in the blood is determined. For pregnant women, these indicators should be lower than 110 g / L in the first trimester and third trimester, and lower than 105 g / l during the second trimester (Peña-Rosas, Viteri, 2009). The level of hemoglobin in postpartum anemia is considered lower than 110 g / l (UK Guidelines, 2011). For arguments sake, that this is iron deficiency anemia, the levels of ferritin and transferrin in blood are determined, that show depleted iron stores and signs of a threat to delivery of iron in tissues (Peña-Rosas, Viteri, 2009).

With the prevalence of anemia among the population of more than 40%, Health Organization (WHO) recommends prescribing iron to the entire population. However, clinical assessment of anemia prevalence does not contain all the information, so the identified 2-3% of clinical cases is already a serious problem (WHO, 2001). It applies to the entire population, and we know that frequency of anemia in pregnant women is high.

Aim. The aim of the research is to evaluate the frequency of anemia during pregnancy and childbirth in different districts of the Transcarpathian region.

Materials and methods
It was a retrospective analysis of medical records of Transcarpathian region. Data of annual reports of medical care for pregnant women, women and mothers in different districts of Transcarpathian region and frequency rates of anemia during pregnancy and childbirth in Transcarpathian region in period from 2012 to 2014 were evaluated. Also the frequency of pregnancies per 1,000 people in different parts of the Transcarpathia was analyzed and the incidence of anemia in lowland and mountain districts of Transcarpathia was compared. Statistical analysis of the data was performed using the methods of descriptive statistics with the help of package of applied programs Statistica 8.0 (StatSoft, USA). The
likely result was considered as $p < 0.05$.

**Results**

During the research it was found, that the largest number of pregnant women in 2014 was observed in Mukachevo district - 26.5 pregnancies per 1000 of the population. Some lower rates occurred in Khust and Berehovo district - 19.9 and 19.5 pregnancies per 1000 of the population respectively. The lowest rate of pregnancies was found in Svaliava district - 10.3 per 1000 of the population (Fig. 1).

In the analysis of frequency of anemia among pregnant women during 2014 it was found that anemia during pregnancy was observed in almost every third pregnant woman in Svaliava district (36.15%), which was the highest parameter among all districts of Transcarpathian region. Some lower rates were observed in Uzhgorod and Beregovo districts - 22.68% and 21.73%, respectively (Tab. 1). The lowest indicators of frequency of anemia in pregnant women was observed in Rakhiv, Khust and Vynogradovo
districts - 7.19%, 7.64% and 8.54% respectively. These features regarding the frequency of anemia during pregnancy indicate that in Svalyava, Uzhgorod and Berehovo districts insufficient attention is paid to the prevention of this disease among pregnant women and women, who are planning pregnancy.

A somewhat different situation was observed regarding the frequency of anemia in childbirth. The highest rate of this pathology was observed in Mukachevo district - 20.57%, somewhat lower in Irshava and Uzhhorod districts - 18.03% and 16.67% respectively. Thus, the lowest frequency of anemia in
childbirth was observed in Beregovo (1.78%), Rakhiv (2.64%) and Svalyava districts (2.84%). When comparing frequency of anemia during pregnancy and childbirth, it was found that in Uzhgorod, Svalyava, Berehovo, Vynogradovo, Mizhhirya, Tyachiv and Rakhiv districts frequency of anemia in childbirth was statistically significantly lower compared to the frequency of anemia during pregnancy (p <0.05). A similar trend was observed in Velykyy Bereznyy, Volovets and Irshava districts, but the difference was statistically improbable (p > 0.05). It should be noted that in Perechyn, Mukachevo and Khust districts there has been a slight increase in the frequency of anemia in childbirth, compared to this indicator during pregnancy, but these changes were statistically improbable (p>0.05).

The maximum reduction in the incidence of anemia in childbirth with respect to the frequency of anemia during pregnancy was observed in Svalyava, Tyachiv and Beregovo districts (from 36.15% to 22.68%, from 17.49% to 2.84%, from 1.78% to 4.00%, respectively (p <0.05).

According to the Resolution of the Cabinet of Ministers of Ukraine in the Transcarpathian region there are 9 districts with localities, which have the status of mountain. It is Velyky Bereznnyy, Volovets, Irshava, Mizhhirya, Mukachevo, Perechyn, Rakhiv, Svalyava, Tyachiv and Khust districts. Comparing frequency of anemia in pregnancy and childbirth in lowland and mountain districts Transcarpathia (Fig. 2), these indicators are almost identical: the frequency of anemia in lowland areas is 16,38, and in mountain areas- 17.24 , the frequency of anemia in childbirth - 11.76 and 11.75 respectively. Also statistically significant reduction of anemia in childbirth is observed compared with frequency during pregnancy in lowland and mountain districts of Transcarpathia (p<0.05).

Comparative analysis of the frequency of anemia during pregnancy and childbirth in period from 2012 to 2014 (Fig. 3) showed that in 2012 and 2013 the frequency of anemia in childbirth is almost the same as the frequency of anemia during pregnancy (p>0.05). Only in 2014 the statistically probable reduction was noted in the incidence of anemia in childbirth compared to the frequency of anemia during pregnancy (p<0.05). It should be mentioned that in 2014 the frequency of anemia in childbirth was significantly lower compared to the same period in 2012 and 2013 and decreased by 35% from 2012 to 2014.

Conclusion

1. In Svaliava district with the lowest index of pregnancies per 1000 of the population (10.3) the highest rate of frequency of anemia during pregnancy and the lowest during delivery was observed, that testifies on one hand the poor prevention of anemia in the region, and on the other hand – effective treatment of anemia in pregnant women.

2. In three districts (Perechyn, Mukachevo, Khust) a slight increase in the frequency of anemia in childbirth was observed compared with the frequency of this disease during pregnancy, however this data were statistically improbable.

3. Due to the fact that the frequency of anemia in pregnancy during the period from 2012 to 2014 remained almost unchanged special attention should be payed to the prevention of this disease.

4. A statistically significant reduction of frequency of anemia in childbirth compared with frequency of anemia during pregnancy in lowland and mountain areas in Transcarpathia (p<0.05) is noted, and these parameters are almost identical.

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