

PREVALENCE AND MANAGEMENT OF PREGNANCY-RELATED ANEMIA IN WOMEN LIVING IN RURAL AND URBAN AREAS, IN THE POLLOG REGION

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Abstract

Anemia is defined as a low number of red blood cells (RBC – Erythrocytes), Hemoglobin (Hb) or Hematocrit (Htc). Anemia during pregnancy most often is a consequence of iron and hemoglobin deficiency (World Health Organization, Iron deficiency anaemia: assessment, prevention and control: a guide for program managers, 2001, What Is Anemia? -NHLBI, NIH". www.nhlbi.nih.gov. Archived from the original on 2016-01-20. Retrieved, 2016;01-31). It is estimated that 1.62 billion people worldwide suffer from anemia, which accounts for 24,8% of the population, and the prevalence of anemia during pregnancy is around 74%. Rarely, anemia during pregnancy can manifest with signs and symptoms of severe anemia (World Health Organization, Worldwide prevalence of anaemia 1993-2005: WHO global database on anaemia, 2008). **Purpose of study:** the purpose of this study is to determine the prevalence of anemia in symptomatic pregnant women, taking into account their residence (urban or rural areas) in the region of Pollog.

Material and methods: This retrospective “cross-sectional” study included a total number of 200 pregnant women of whom 100 pregnant women live in urban areas, and 100 pregnant women live in rural areas with an identical age average of 25.60 ± 12.00 years. The data was collected from January until October of 2018. In each pregnant patient, we examined the concentrations of RBC, Hb, Htc, and iron (Fe^{++}) during each trimester of pregnancy. **Results:** The average value and standard deviation values for anemia during pregnancy in women living in rural and urban areas are presented. In the rural areas, anemia was present in 100 women whereas in women living in urban areas anemia was present in 100 pregnant women. The results from the obtained values for the examined parameters (RBC, Hb, Htc and Fe^{++}) for women living in rural and urban areas are presented in tabular and chart forms (Table 3 and Chart 2). From the obtained values, a significant statistical difference was observed for $p=0,0001$ between women of rural and urban areas. **Conclusion:** in our paper we observed that women in living in urban settlements had higher concentrations of the examined parameters (RBC, Hb, Htc, Fe^{++}) with a significant difference of $p=0.0001$ in comparison to women who live in rural areas. Awareness of anemia in women living in rural settlements was lower compared to women living in urban areas. Anemia between these groups of women can be attributed to inadequate diet, poor access to health services, literature, lack of knowledge about the effects and consequences of anemia on the baby, lifestyle, etc. We think there is a need for contribution through lectures, more frequent checks, brochures for the raising of awareness on consequences of anemia, in women living in rural areas, is needed, which we think would significantly affect the reduction of the rate of prevalence of anemia in pregnant women among those living in rural areas.

Keywords: anemia during pregnancy, urban and rural areas

1. Introduction

Anemia is a medical condition in which RBCs are unable to provide sufficient oxygenation for the tissues, thus ensuing manifestations of multi-organ hypoxemia, and inability to fully perform bodily functions (National Bureau of Statistics (NBS) [Tanzania] and ORC Macro, Tanzania Demographic and Health Survey 2004–05, National Bureau of Statistics and ORC Macro, Dar es Salaam, Tanzania, 2005.). According to WHO, if population studies find that the prevalence of anemia is $\geq 40\%$, then this is a public health concern. Etiology of anemia during pregnancy is multi-factorial, but most often arises due to:

- Nutritive deficiencies – vitamin and mineral deficiencies (iron deficiency, folate deficiency, vitamin A deficiency, vitamin B12 deficiency)
- Infections: Parasitic infections (malaria) or chronic infections (TB, HIV) (E. M. McClure, S. R. Meshnick, P. Mungai et al., “The association of parasitic infections in pregnancy and maternal and fetal anemia: a cohort study in coastal Kenya,” *PLOS Neglected Tropical Diseases*, vol. 8, no. 2, Article ID e2724, 2014., 2014, S. Ononge, O. Campbell, and F. Mirembe, “Haemoglobin status and predictors of anaemia among pregnant women in Mpigi, Uganda,” *BMC Research Notes*, vol. 7, no. 1, article no. 712, 2014.).

Rarely, anemia during pregnancy can manifest with signs and symptoms of severe anemia. Around 74% of women in the world suffer from anemia during pregnancy (Haggaz *et al.*, 2010, World Health Organization., 2011. Gunawardena S et al. 2012). Up to 40-48% of women worldwide have very low values of Fe^{++} depots during pregnancy, which significantly affects anemia. Anemia during pregnancy is not only a problem in low- and middle-income countries, but also in high-income countries. (Winter WE, Bazydlo LA, Harris NS. The molecular biology of human iron metabolism. *Lab Med* 2014; 45: 92-102) Inadequate maternal nutrition without sufficient daily intake of Fe^{++} during pregnancy can alter the physiological functions that lead to an increased risk of chronic cardiovascular disease in the and development of the fetus, which it may affect it for life. Fetal growth and development are extremely sensitive to the lack of Fe^{++} -free foods which is the most common cause of anemia during pregnancy especially in pregnant women living in rural areas (Harvey L, Boksa P. Additive effects of maternal iron deficiency and prenatal iron deficiency on adult behaviors in rat offspring. *Brain Behav Immun*. 2014; 40: 27-37, Bastian T W, Anderson J A, et al. Fetal and neonatal iron deficiency reduces thyroid hormone-responsive gene mRNA levels in the neonatal rat hippocampus and cerebral cortex. *Endocrinology*. 2012; 153 (11): 5668- 5680). A significant number of pregnant women in rural areas were housewives and lacking secondary education (75%), which explains their unawareness for the consequences of anemia, compared to 90% of pregnant women living in urban who were educated, were highly informed about anemia related to pregnancy. A very small proportion of rural women (25%) were aware of the effects of anemia and were aware of the consequences of anemia on fetal development. According to the WHO, anemia during pregnancy is considered any anemia with values of $Hb < 110 g/l$. Premature birth with low fetal birth always accompanies anemia during pregnancy. ([8]Levy A, Fraser D, et al. Maternal anemia during pregnancy is an independent risk factor for low birth weight and preterm delivery. *Eur J ObstetGynecolReprod Biol*. 2005; 122: 182-186, Bondevik GT, Lie RT, et al. Maternal hematological status and risk of low birth weight and preterm delivery in Nepal. *Acta ObstetGynecol Scand*. 2001; 80: 402-408).

PURPOSE OF THE STUDY: The purpose of this study is to determine the prevalence of anemia in symptomatic pregnant women, taking into account the residence (urban or rural areas) in the region of Pollog.

2. Material and methods

This retrospective “cross-sectional” study included a total number of 200 pregnant women of whom 100 pregnant women live in urban areas, and 100 pregnant women live in rural areas with an identical age average of 25.60 ± 12.00 years. The working data were obtained from the clinical laboratory at the Clinical Hospital of Tetovo, in cooperation with family gynecologist. The data was collected from January until October in 2018. In each pregnant patient, we examined the concentrations of RBC, Hb, Htc, and iron (Fe^{++}) during each trimester of pregnancy.

Living environment	Number of women living in respective areas	Average age \pm DS
Rural Area	100 (100 %)	25,60 \pm 12,00years
Urban Area	100 (100 %)	25,60 \pm 12,00years
Total number	200	

Table 2: Pregnant women included in the study

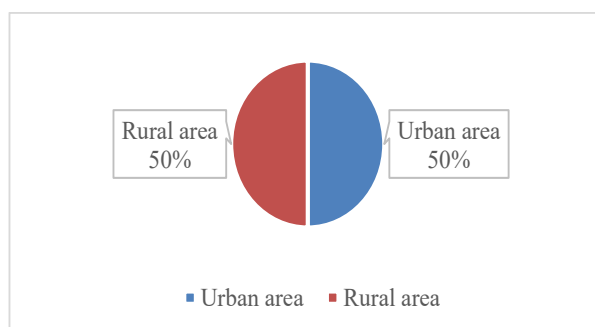


Chart 1: Number of women included in the study, living in the region of Pollog

STATISTICAL ANALYSIS OF THE EXAMINED MATERIAL: In this study the basic statistical operations (the average value, and standard deviation $X \pm SD$) were applied. Statistical analysis was performed with the help of the SPSS software package (Statistical Package for the Social Science, version 17). The normality of the distribution of results was tested with the method of Skewness and Kurtosis.

3. Results

The results of average values and standard deviation for the different measured values for pregnant women are presented in a tabular and chart form. In the rural areas, anemia was present in 100 women whereas in women living in urban areas anemia was present in 100 pregnant women. The results from the values obtained from the examined parameters (RBC, Hb, Htc and Fe^{++}) for women living in rural and urban areas are presented in

Table 3: Values of the examined parameters for the anemic pregnant women living in rural and urban area prior to treatment with iron preparations and Chart 2.

Total number of tested subjects (200)	Rural area	Urban area	p value
Number of anemic pregnant women	100	100	
RBC (10^{12} cells/L)	3,10 \pm 0,30	3,90 \pm 0,90	0,0001
Hb (mmol/L)	4,80 \pm 0,40	6,50 \pm 0,80	0,0001
Htc(%)	0,30 \pm 0,20	0,40 \pm 0,80	0,0001
Fe^{++} (μ mol/L)	5,20 \pm 0,80	6,50 \pm 0,50	0,0001

Table 3: Values of the examined parameters for the anemic pregnant women living in rural and urban area prior to treatment with iron preparations

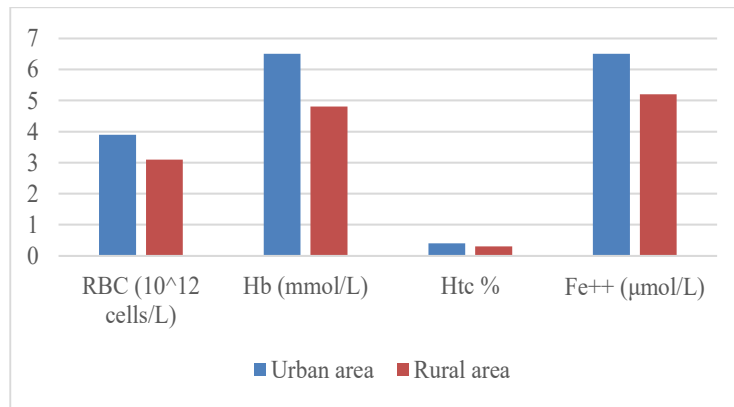


Chart 2: Comparison between measured values for women living in urban and rural areas

From table 3 and Chart 2 we can conclude that anemia during pregnancy is with a higher prevalence among women living in rural areas, compared to women living in urban areas, with a statistical significance of $p=0.0001$.

Number of tested subjects (200)		RBC (10^{12} /L)	Hb (mmol/L)	Htc (%)	Fe ⁺⁺ (μ mol/L)
Rural Area	100	4,20 \pm 0,60	7,40 \pm 0,80	0,42 \pm 0,80	8,50 \pm 1,00
Urban Area	100	4,60 \pm 0,90	8,00 \pm 0,40	0,48 \pm 0,60	9,20 \pm 1,50

Table 4: Hemogram values after application of iron supplement therapy (30-40 mg/day)

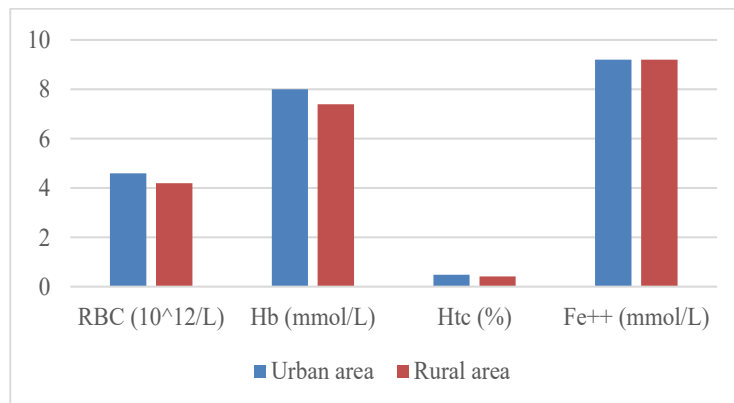


Chart 3: Comparison between measured values for women living in urban and rural areas after application of iron supplementation therapy

Table 4 shows that after treatment with Fe⁺⁺ supplementation therapy (30-40 mg), a significant difference was observed in the correction of the hematological values (RBC, Hb, Htc, Fe⁺⁺) for the two groups of examined values. The results are presented in Chart 4 and Chart 5, which shows a graphical representation of the high positive effect of corrected anemia, in previously anemic pregnant women.

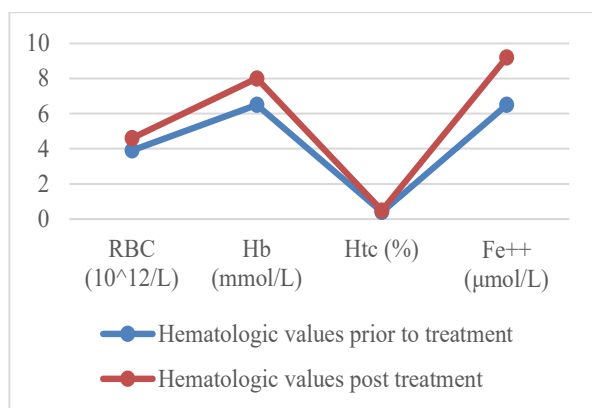


Chart 4: The effect of treatment of anemia in pregnant women living in urban areas

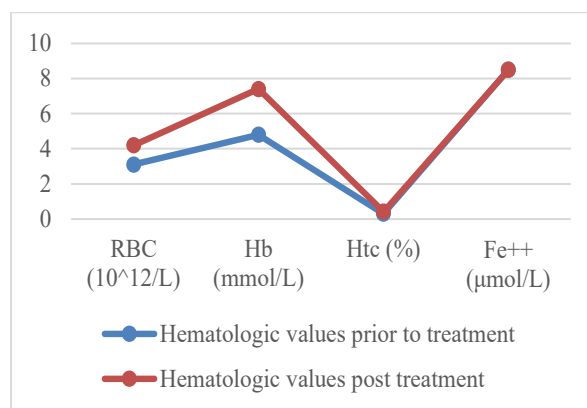


Chart 5: The effect of treatment of anemia in pregnant women living in rural areas

4. Discussion

Anemia during pregnancy is still a global public health problem. Etiology of anemia during pregnancy is multifactorial, but most often it arises due to iron deficiency or decrease of hemoglobin concentration. A decrease in hemoglobin levels during pregnancy is caused by the excessive increase in plasma volume in relation to the nonproportional increase of RBC volume. This difference between the growth of plasma and the concentration and volume of RBC is most significant during the second trimester. (Beaton GH, Corey PN & Steel C (1989). Conceptual and methodological issues regarding the epidemiology of iron deficiency. *Ann Clin Nutr* 50: 575-585). A number of studies on pregnancy related anemia in rural and urban areas, have suggested that improvement of the general nutrition state of pregnant women in rural areas, and the increase of awareness about the unwanted effects of anemia, would have a vast effect in the decrease of prevalence of anemia. Iron deficiency occurs when iron depots are reduced resulting with a decreased ability of mobilization of iron to meet the body's demands in times when iron is most needed during pregnancy. The absence of iron deposits (or their exhaustion) is followed by reduced production of hemoglobin and RBC. Plasma volume during pregnancy increases above 50% which is consequently results with physiological hemodilution of RBC. This effect is manifested with a decrease of hematocrit in the range of 30-34% (Values of hematocrit in nonpregnant women are 38-45%), even though the iron depots are normal (Dallman PR, Yip R, Johnson C. Prevalence and causes of anemia in the United States, 1976 to 1980. *Am J Clin Nutr* 1984; 39:437-45).

[4] There are documented facts that pathophysiological processes leading to anemia in pregnancy most often occur due to a decrease of RBCs, decrease of Hb, iron (Fe^{++}) deficiency, reduced iron reabsorption from the digestive tract, increased iron losses from the body, increased needs of the body for iron during pregnancy, hemorrhages etc. In women living in rural areas, the lack of iron in the diet is the most often etiology for anemia and this etiology is due to insufficient intake of food rich in iron (lack of fruits and vegetables rich in iron from the diet) and unawareness about the consequences of anemia. If there is a case of iron-deficient anemia, it is preferred that pregnant women should intake 3-4 times more iron with diet (instead of 1-2 mg of Iron, she should intake 3-6 mg iron in 24 hours) in order to meet the bodies increased requirements for iron (Timothy G. Janz, Roul L. Johnson RL, Scot D. Rubenstein. "Anemia in the emergency department: evaluation and treatment". *Emergency Medicine Practice*. 15 (11): 1-15, quiz 15-6 Archived from the original on 2016;10-18.. During pregnancy women spend iron for their own metabolic needs, but also this iron is used by the fetus for its own metabolic needs. (Mitrache C, Passweg JR, Libura J et al. Anemia: an indicator for malnutrition in the elderly. *Ann Hematol* May;2001;80 (5): 295 -298[9]). Signs and symptoms of anemia begin to manifest when there is a decrease in Hb <75-80 g/L, and the clinical picture is dominated by: fatigue,

dizziness, headache, facial pallor, sinus tachycardia, dyspnea, inappetence, weakened immune system and tendency for infections, etc. Anemia during pregnancy does not affect only the mother, it also has consequences on the fetus, such as low birth weight, premature birth, weakened immunity, etc. Evidence shows that the gestation period requires adequate amounts of iron to increase blood volume to supply the fetus with enough blood and to help a normal fetal growth. Anemia during pregnancy can be easily avoided by consumption of foods rich in iron, or by application of iron supplementation therapy. Some severe cases require blood transfusion. During our study iron was administered orally (tablets and capsules), and in some cases parenterally. Our study verified a higher prevalence of anemia in pregnant women living in rural areas, in relation to the pregnant women living in urban zones. Pregnancy related anemia in women in rural zones most often occurred due to poor consumption of iron-rich foods. Consumed food consisting of fruits and vegetables rich in iron in women living in rural areas was below the proper necessary level. Most rural women were also engaged in physical work in the fields and this affects the increase in demand for their energy needs, and increase of foods rich in iron. Women from rural areas were not aware of the consequences of anemia. The level of education among women living in rural zones was low, with approximately 53% of women from rural areas having attended primary school, compared to the 80% of women from urban areas that had attended primary school. A very low proportion of women living in rural areas (25%) were aware of the consequences of anemia, whereas 80% of women living in urban areas were aware of the consequences of anemia.

5. Conclusion

Prevention of anemia during pregnancy should be firstly by consumption of foods rich in iron. Patients with more severe anemia should be treated with iron supplementation therapy 30-40 mg/day. Our experience is that the effects are positive when iron therapy is adjuvanted with folic acid vitamin B12. Our patients that underwent this regime showed a very positive effects in correction of anemia.

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