Iranian Journal of Reproductive Medicine Vol.8. No.2. pp: 66-69, Spring 2010

Prevalence of anemia risk factors in pregnant women in Kerman, Iran

Fatemeh Mirzaie M.D., Nahid Eftekhari M.D., Sedigheh Goldozeian M.D., Jamileh Mahdavinia M.D.

Department of Obstetrics and Gynecology, Afzalipour Hospital, Kerman University of Medical Sciences, Kerman, Iran.

Received: 22 June 2009; accepted: 17 January 2010

Abstract

Background: Anemia in pregnancy is associated with increased rates of maternal and perinatal mortality**.**

Objective: To study the prevalence and risk factors of women with anemia during pregnancy in Kerman, Iran.

Materials and Methods: A retrospective cross-sectional study was performed based on 2213 pregnancies delivered during the years 2005-2007 in Kerman, Iran. Women with hemoglobinopathies such as thalassemia were excluded from analysis. Anemia was defined as hemoglobin (Hg) lower than 11 g/dl during pregnancy. Categorical variables were compared using the chi-square or Fisher's exact test.

Results: Overall, 104 (4.7%) women were anemic (Hg<11g/dl), out of which 4.8% had severe anemia (Hg<7g/dl), 15.4 % had moderate anemia (Hg=7-8.9 g/dl) and 79.8% had mild anemia (Hg=9-10.9 g/dl). The frequency of anemia were 5%, 3.4% and 5.7% in the first, second and third trimester, respectively. Multiparity was associated with lower hemoglobin concentration during the second/third trimester of pregnancy (p=0.03 and p<0.001, respectively). Prevalence of anemia was significantly higher in smokers and opium users (p=0.01 and p=0.003, respectively).

Conclusion: Our study showed that prevalence of anemia was not high in this study. Factors associated with anemia during pregnancy were parity, smoking, opium use and not using Iron supplement.

Key words*: Anemia, Prevalence, Pregnancy, Risk factors.*

Introduction

Anemia is a major health problem that affects 25% to 50% of the population of the world and approximately 50% of pregnant women (1). Anemia in pregnancy is associated with increased rates of maternal and perinatal mortality, premature delivery, low birth weight and other adverse outcomes (2). The probable predisposing factors for anemia in pregnant women include parity, low socioeconomic status and substance abuse among others (3-5). Anemia in non-pregnant women is defined as hemoglobin less than 12 g/dl. The cutoff suggested by United States Center for Diseases Control described anemia as a hemoglobin less than 11g/dl in the first and third trimester and less than 10.5 g/dl in the second trimester (6).

The World Health Organization (WHO) defined anemia as hemoglobin concentration below 11g/dl in pregnancy (7). The WHO estimates the prevalence of anemia 17.5%-40.5 % in female of reproductive age. This report does not include pregnant women in Iran (8). The present study was conducted to investigate the prevalence and risk factors for anemia in pregnant women in Kerman, Iran.

Materials and methods

This cross sectional study was conducted between January 2005 and December 2007 on pregnant women referring to University Teaching Hospital of Kerman. The study protocol was

Corresponding Author:
Fatemeh Mirzaie, Department of Obstetrics and Gynecology, Afzalipour Hospital, Kerman, Iran.
Email: swt_f@yahoo.com

[Downloaded from ijrm.ir on 2026-11-12]

approved by the ethics committee at Kerman University of Medical Sciences. Informed consent was obtained from each participant before enrollment. Inclusion criteria were as follows; a single fetus without history of chronic hypertension, diabetes, thyroid, cardiac diseases and systemic lupus erythematosis. Women with hemoglobinopathies such as thalassemia were excluded.

Hemoglobin concentration was recruited from perinatal medical records, and cases were studied in first (0-14 wks), second (15-28 wks) and third (29-42 wks) trimester. Gestational age was determined on the basis of the information on menstrual history and early ultrasound examination.

A checklist was used to record information about age, parity, iron use, history of cigarette smoking and opium consumption in the parturient. The other variables including obstetrics complications such as: placenta previa, placental abruption, preeclampsia, birth weight, and gestational age at delivery and route of delivery were recorded.

Statistical analysis

Results were reported as mean ± standard deviation (SD) or median. Categorical variables were compared using the Chi-square or Fisher's exact test. Independent sample t-test was used to compare quantitative variables (such as hemoglobin level and age) between groups. For comparison of anemia between age and educational level Kruskal-wallis test was used.
For statistical analysis, the statistical software SPSS version 13.0 for Windows (SPSS Inc., Chicago, IL) was used. All p values were 2 tailed and statistical significant was defined by $p \leq 0.05$.

Results

Generally, of 2223 pregnancies, the median age was 26.82±5.84 (12-48) years. Median age of anemic women was 27.15±6.25 years and in non-anemic group it was 26.8±5.82 years (p=0.55). Generally, 104 (4.7%) of the study population were anemic (Hg<11gr/dl), out of which 4.8% had severe anemia (Hg<7g/dl), 15.4% had moderate anemia (Hg: 7-8.9g/dl) and 79.8% had mild anemia (Hg: 9-10.9g/dl). The frequency of anemia was 5%, 3.4% and 5.7% in the first, second and third trimester, respectively. 1154 (45.5%) were multipara and it was associated with lower hemoglobin concentration during the second/third trimester of pregnancy (p=0.03 and p<0.001, respectively) (Table I).

Twenty–one (1%) of all patients were smokers and anemia was observed in 19% of smokers vs. 4.6% of non-smokers but no significant differences were found in hemoglobin concentration in different trimesters (Table I). Eighty (3.8%) of women were opium users, that 12.5% of them were anemic (p=0.003) and opium users were associated witch lower hemoglobin concentration in third trimester (p=0.03) (Table I).

Generally, 2017 (91%) of patients had used iron supplements during pregnancy. In iron supplements users 4% and in others 11.9% were anemic (p<0.001). There was no significant association between anemia with maternal education and threatened abortion (Table II).

Median gestational age at delivery was 37.82±2.5 (26-43.8) weeks and 516 of births (23.5%) were before 37 weeks. The prevalence of anemia was 5.9% in women with preterm delivery while this was 4.3% in term deliveries (p=0.034).

Table I. Hemoglobin concentration in relation to maternal risk factors for anemia in different trimesters of pregnancy.

	First trimester		Second trimester		Third trimester	
	Hg concentration mean±SD	p-value	Hg concentration mean±SD	p-value	Hg concentration mean±SD	p-value
Parity						
0	13.6±1.4	0.33	14±1.6	0.03	14.09±1.5	<0.001
>1	13.5±1.5		13.7±1.6		13.5±1.94	
Smoking						
Yes	12.6±2.7	0.24	13.9±2.05	0.96	14±1.5	0.76
No	13.8±1.6		13.8±1.66		13.8±1.7	
Opium-use						
Yes	13.1±1.5	0.16	13.2±2.8	0.26	13.1±2.2	0.03
No	13.5±1.5		13.8±1.59		13.8±1.7	

[Downloaded from ijrm.ir on 2026-11-12]

Table II. Maternal characteristics and prevalence of anemia.

Variable	N (%)	Prevalence of anemia n (%)	p-value
Maternal age			
<20	132 (6.2)	9 (4.9)	0.77
20-29	1321 (62.7)	61 (4.5)	
30-39	609 (28.9)	33 (5.2)	
≥40	47 (2.2)	1 (2.1)	
Maternal education			
Less than high school	1356 (61.3)	68 (3.8)	<0.001
High school graduate	799 (36.1)	34 (11.4)	
Beyond high school	58 (2.6)	2 (3.4)	
Parity			
Nuliparity	945 (44.8)	33 (3.2)	0.002
Multiparity	1164 (55.2)	71 (5.8)	
Smoking			
Yes	21 (0.9)	4 (19)	0.013
No	2088 (99.1)	100 (4.6)	
Opium use			
Yes	80 (3.8)	10 (12.5)	0.003
No	2029 (96.2)	94 (4.4)	
Iron use			
Yes	1916 (90.8)	81 (4)	<0.001
No	193 (9.1)	23 (11.9)	
Threatened abortion			
Yes	379 (17.9)	14 (3.3)	0.4
No	1731 (82.1)	90 (4.9)	

Discussion

The prevalence of anemia in this study was 4.7%; it was less than prevalence of anemia that was reported by WHO in non pregnant women in Iran (17.5%-40.5%), but it was similar to Vahidian study (4.8%) (9).

In Iran, iron and folate supplements are routinely prescribed for pregnant women. Generally, 91% of our patients had used iron supplements during pregnancy. Measured hemoglobin levels could be affected by iron and folate supplements and this may be the cause of lower prevalence of anemia comparing with those reported by WHO (10).

The prevalence of anemia varies during the course of pregnancy. In this study, we found a 5% prevalence of anemia at the first trimester, 3.4% at the second trimester and 8.7% at the third trimester. In normal pregnancy, the expansion of the plasma volume which precedes the increase in red cell mass, creates a disproportionate expansion of plasma volume (50%) compared with the increase in red cell mass (30%). Therefore, "hemoglobin values start to decline during the early phase of first trimester and reach their nadir near the end of second trimester" (11). The prevalence of anemia observed in this study reflected the change of hemoglobin values during pregnancy.

Effect of multiparity on anemia is unknown, in this study, there was significant association between anemia and parity while in Adam *et al* study, there were no significant association between anemia and parity (12).

Smoking is a legal and socially tolerated form of substance abuse. The incidence of smoking in the pregnant population has increased in recent decades to between 16.3% and 52%; depending on the characteristic of the patient group, however there is evidence that it is declining in some populations (13-16).

In our study, 1% of all women were smoker. Anemia was seen in 19% of smokers vs. 4.6% in non-smokers. It was similar to Subramoney *et al* study, that showed mean hemoglobin levels were significantly lower in smokers (10gr/dl) compared with non smokers (10.46gr/dl) ($p<0.001$) (17).

Substance abuse during pregnancy is an increasing problem that is associated with significant maternal and fetal morbidity (18). Substance use during pregnancy ranges from 0.4% to 27% depending on the population surveyed (19). In this study 3.6% of women were opium users that 12.5% of them were anemic ($p=0.003$). Factors such as poor nutrition, social problems, and poor antenatal attendance are involved in anemia.

We found preterm delivery in 23% of pregnancies, anemia was observed in 5.9% with preterm delivery vs. 4.3% in term delivery. Several

[Downloaded from ijrm.ir on 2026-11-12]

studies, documented sub-optimal fetal outcomes, such as: low birth weight and preterm delivery (20-22). Other investigators however did not find any association between maternal anemia and adverse pregnancy outcome (23).

Conclusion

Based on our study prevalence of anemia was not high. Cigarette smoking, opium consumption, and multiparity were associated with the risk of anemia.

Acknowledgement

The authors would like to thank Farzan Institute for Research and Technology for technical assistance.

References

1. World Health Organization. The prevalence of anemia in women: a tabulation of available information. Geneva, Switzerland: WHO; 1992.
2. Van den RB, Broak NR. Etiology of anemia in pregnancy in South Malawi. *Am J Clin Nutr* 2000; 72: 247S-256S.
3. Van den Broek NR, Rogerson SJ, Mhango CG, Fletcher KA, Chimsuku LH, Ngwira BM, et al. Anemia in pregnancy in Southern Malawi: prevalence and risk factor. *BJOG* 2000; 107:437-438.
4. Amadi AN, Onwere S, Kamanu CI, Njoku Njoku OO, Aluka C. Study on the association between maternal malaria infection and anemia. *J Med In Vest Pract* 2000; 1: 23-25.
5. Aluka C, Amadi AN, Kamanu CI, Feyi-Waboso PA. Anemia in pregnancy in Abia State university teaching hospital Aba. *J Med Invest Pract* 2001; 92:58- 61.
6. World Health Organization: Report of WHO group of experts on nutritional anemia. Technical report series. Geneva, WHO, 1972.
7. Centers for Diseases Control: Criteria for anemia in children and childbearing-aged women. *MMWR* 1989; 38: 400- 404.
8. World Health Organization (WHO): The database on anemia includes data by country on prevalence of anemia and mean hemoglobin. Geneva, Switzerland: WHO; 2007.
9. Vahidinia AA, Shams S. Assessment of serum iron and iron deficiency anemia in sample of pregnant woman at delivery in Iran. *Asia Pac J Clin* 2004; 13:159-163.
10. Mahomed K, Iron and folate supplements in pregnancy. *Cochrane Database Syst Rev* 2000:CD00135.
11. Medicine of Medicine. Nutrition during pregnancy. Part II: Nutrient Supplements .Washington, DC: National Academy press, 1990.
12. Adam I, Khamis AH, Elbashir MI. Prevalence and risk factors of anemia in pregnant women of eastern Sudan. *Transa R Soc Tropl Med* 2005; 99:739-743.
13. Ioka A, Tsukuma H, Nakamura K. Lifestyles and pre-eclampsia with special attention to cigarette smoking. *J Epidemiol* 2003; 13:90-95.
14. Ventura SJ, Hamilton BE, Mathews TJ, Chandra A. Trends and variations in smoking during pregnancy and low birth Weight: Evidence from the birth certificate, 1990-2000. *Pediatrics* 2003; 111:1176-1180.
15. Tuthill DP, Stewart JH, Coles EC, Andrews J, Cartildge PH. Maternal cigarette smoking and pregnancy outcome. *Paediatr Perinat Epidemiol* 1999; 13:245-253.
16. Zotti ME, Replogle WH, Sappenfield WM. Prenatal smoking and birth outcomes among Mississippi residents. *J Miss State Med Assoc* 2003; 44:3-9.
17. Subramoney S, Gupta PC. Anemia in pregnant women who use smokeless to tobacco. *Nicotine Tob Res* 2008; 10:917-920.
18. Haller DL, Miles DR, Dawson KS. Victimization and perpetration among perinatal substance abusers. *J Interpers Violence* 2003; 18:760-780.
19. William F, Rayburn MD. Maternal and fetal effects from substance use. *Clin Perinatol* 2007; 34:559-571.
20. Bondevik GT, Lie RT, Ulstein M, Kvale G. Maternal hematological status and risk of low birth weight and preterm delivery in Nepal. *Acta Obstet Gynecol Scand* 2001; 80: 402-408.
21. Malhorta M, Sharma JB, Batra S, Sharma S, Murthy NS, Arora R. Maternal and perinatal outcome in varying degrees of anemia. *Int J Gynaecol Obstet* 2002; 79:93-100.
22. Hamalainen H, Hakkarainen K, Heinonen S. Anaemia in the first but not in the second or third trimester is a risk factor for low birth weight. *Clin Nutr* 2003; 22: 271-275.
23. Lu ZM, Goldenberg RL, Cliver SP, Cutter G, Blankson ML. The relationship between maternal hematocrit and pregnancy outcome. *Obtet Gynecol* 1990; 71:190-194.

[Downloaded from ijrm.ir on 2026-11-12]