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Original Research Article

Prevalence of Anemia among Pregnant Women in Riyadh, Saudi Arabia

Ali Alghamdi

Family Medicine Senior Registrar/ PSMMC/ Riyadh, Saudi Arabia.

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ABSTRACT

Background: Anemia in pregnancy is a major problem worldwide. Due to lack of information about the magnitude of anemia in our institute and the need to improve the quality of care, the objective of this study is to determine the prevalence of anemia among pregnant women registered for antenatal care at Wazarat Health Center in Prince Sultan Medical Military City in Riyadh. And to determine the association between anemia in pregnancy and certain socio-demographic factors.
Materials and Methods: Data was collected from a sample of antenatal records of all pregnant women registered for antenatal service at AL-Wazarat Health Center during the period of January till December of 2012. The study design was cross-sectional study (record based). Sample sizes were 372 pregnant women. Cross-tabulation and analysis of the data was done by chi-square test of various variables against hemoglobin concentration profile.
Results: Seventy-six (20.4%) of the study group were anemic (hemoglobin level < 11 g/dl). Out of which, 12.6% were mildly anemic, 7.5% were moderately anemic and 0.3% was severely anemic. The prevalence of anemia increased significantly with increased gestational age (*P*= 0.000). The women age, parity and educational level did not affect the hemoglobin level of the pregnant women in this study (P> .05).
Conclusion: Although the prevalence of anemia in this study is low compared to other studies in Saudi Arabia, anemia is still a significant problem facing the pregnant women and jeopardizing their outcomes. So, it is recommended to increase the efforts toward the health education of women in childbearing age regarding the importance of preconception care regarding adequate intake of iron-rich dietary sources and supplementation with iron and folic acid. Other recommendation during pregnancy aims to early detect and treat the anemia before delivery.

Key words: Prevalence, Anemia, Pregnancy, Riyadh, Saudi Arabia.

INTRODUCTION AND LITERATURE REVIEW

During pregnancy, a lot of changes occur in the body to accommodate the feto-placental system. Among these changes in the hematological system are physiologic anemia, neutrophilia, thrombocytopenia, increased coagulant factors and decreased fibrinolysis. [1]

In the early pregnancy up to 12 week of gestation, the plasma volume increases by 15 %. [1-3] It continues to increase till 30 to 34 weeks, after which there is only a modest rise. At the end of pregnancy the average expansion is about 1100 to 1600 mL and leading to a plasma volume of 4700 to 5200 mL, 30 to 50 % above the non-pregnant women level. [1,4]

After delivery the plasma volume decreases immediately, then increases again two to five days later, possibly because of a rise in aldosterone secretion, which occurs at this time. Plasma volume then decreases; but still elevated by 10 to 15 percent above non-pregnant levels at three weeks postpartum. It is usually returning to normal non-pregnant levels at six weeks postpartum. [4]

This expansion in the plasma volume in relation to the hemoglobin mass and red blood cells volume is the attributed cause for low hemoglobin level that's found in healthy pregnant women (i.e., physiological or dilutional anemia of pregnancy). The greatest disproportion between the rates at which plasma and erythrocytes are added to the maternal circulation occurs during the late second to early third trimester (lowest hemoglobin is typically measured at 28 to 36 weeks). [5] Nearer to term, hemoglobin concentration increases due to cessation of plasma expansion and continuing increase in hemoglobin mass. Conversely, the absence of physiologic anemia appears to be a risk factor for stillbirth. [6]

Choosing a precise definition of anemia in pregnant women is not straightforward, given that the pregnancy is associated with changes in plasma volume and red blood cell mass, the normal differences in hemoglobin concentrations between women and men, also ethnic variability between white and black women, and the frequency of iron supplementation use in pregnancy. [7]

The Centers for Disease Control and Prevention has defined the anemia in pregnancy as hemoglobin levels of less than 11 g/dL (hematocrit less than 33 percent) in the first and third trimesters and less than 10.5 g/dL (hematocrit less than 32 percent) in the second trimester. [7] Since hemoglobin and hematocrit levels are lower in African-American adults, the Institute of Medicine recommends lowering the hemoglobin cut-off level by 0.8 g/dL in this population. [8]

The World Health Organization defines anemia in pregnant women as hemoglobin <11 g/dL or hematocrit < 33 percent. [9] Severe anemia in pregnancy is defined as hemoglobin 7 g/dL and it requires medical treatment. Very severe anemia is defined as hemoglobin 4 g/dL and is a medical emergency due to the risk of congestive heart failure.

Pregnant women with hemoglobin concentrations below these levels can be considered anemic and they should be investigated with the standard evaluation (complete blood count, review of peripheral smear, reticulocyte count, serum iron study). [10] In the United States, about 16 to 29 percent of the pregnant women become anemic at the third trimester. [11] The physiological anemia can be attributed to the hemoglobin levels of up to 10 g/dl because there are different factors that can affect the hemoglobin level in same individual.

In the developing countries, it has been found that the anemia is more severe and chronic compared to the developed countries. The fetal complications are common with more severe pregnancy anemia. And it has been found that the maternal hemoglobin below 6 g/dL has been associated with decrease in amniotic fluid volume, fetal cerebral vasodilation, and non-reassuring fetal heart rate patterns. [12] Also prematurity, spontaneous abortion, low birth weight, and fetal death have also been reported. [13] In addition, severe anemia increases the risk of maternal mortality. There is no evidence that maternal anemia increases the risk of congenital anomalies in the fetus. [14]

The risk factors for chronic severe anemia includes inadequate iron stores due to nutritional deficiency and poverty, intestinal helminthic infections, folate deficiency due to inadequate intake, and chronic hemolytic states, such as chronic malaria infection. [15,16] But, the good thing is that this type of severe anemia can be prevented by improving the nutritional status and providing iron supplementation along with good and effective infection control measures. [16,17]

In a study done in china, they found supplementing the pregnant women with iron-folic acid was associated with higher maternal hemoglobin, less preterm birth and fewer neonatal deaths than with folate alone. [16] However, about forty percent of women were still anemic in the third trimester. A similar study found that an iron-folic acid supplement given to pregnant

Nepalese women in an area where iron deficiency was common found to be associated with improvement in some aspects of intellectual and motor function in offspring evaluated at age 7 to 9 years. [17]

Severe anemia contribute to major risk on the fetus, so it is of important to treat it aggressively with blood transfusion especially if there are signs that suggest hypoxemia in the fetus. [16]

Iron requirements for the women in a typical singleton gestation are about 1000 mg over the course of pregnancy. About 300 mg for the placenta and fetus and approximately 500 mg for the expansion of the maternal hemoglobin mass due to increase in the plasma volume. The remaining 200mg is excreted in the urine, gut and through the skin. Since most women do not have adequate iron stores to handle the demands of pregnancy, iron is commonly prescribed as part of a prenatal multivitamin or as a separate supplement. In general, women taking iron supplements have a mean hemoglobin concentration that is 1 g/dL greater than that of women not taking supplements. [18]

Since iron deficiency anemia is the most common nutritional deficiency disorder in the world, WHO has estimated the prevalence of anemia in developed countries to be 14% and in developing countries 51%. [18]

Globally anemia in pregnancy is an important public health problem. It has been found that more than half of pregnant women in the World have a hemoglobin level indicative of anemia (< 11.0gldl). In developing countries the prevalence may be as high as 56 or 61%. [19] Due to increase in physiological demand of pregnancy for iron and other important vitamins and the inability to meet the required level for these substances either as a result of dietary deficiencies or infection, this can give rise to anemia. [20]

Anemia severity can be classified according to WHO to mild (10.0-10.9), moderate (7.0-9.9) and severe (< 7). [21]

Women in developing countries are always in a state of unstable iron balance during their reproductive years. Their iron stores are not well developed because of poor nutritional intake, recurrent infections, menstrual blood loss and repeated pregnancies. During the first 2 trimesters of pregnancy, iron-deficiency anemia increases the risk for preterm labor, low-birth weight babies and infant mortality and predicts iron deficiency in infants after 4 months of age. [14] It is estimated that anemia accounts for 3.7% and 12.8% of maternal deaths during pregnancy and child birth in Africa and Asia, respectively. [22]

In the Arab Gulf countries, maternal anemia, especially iron deficiency anemia has been considered as of the important public health problems with a prevalence ranging from 22.6% to 54.0%. [23]

Recent local studies in Saudi Arabia showed prevalence of 41.3% in 2008 in the eastern province. [24] In another study done earlier in 1994 in south region, the prevalence of anemia was 31.9%. [25]

Because anemia is the most frequent maternal complication of pregnancy, antenatal care should therefore be concerned with its early detection and management. [26]

Due of lack of information about the magnitude of anemia in our institute which serve a huge number of pregnant women through its antenatal service and the need to improve the quality of care. The objective of this study is to determine the prevalence of anemia among pregnant women registered for antenatal care at Wazarat Health Center in Prince Sultan Medical Military City. And to determine the association between anemia in pregnancy and certain socio-demographic factors (age, parity, gestational age, education level).

METHODOLOGY

The study setting

AL-Wazarat Health Center in Prince Sultan Medical Military City which serves 3550 of military families and dependents in Riyadh. Also, it is a training center for family medicine program accredited by Saudi Commission of health specialties.

And providing antenatal care for pregnant women through a well organized and comprehensive antenatal clinics.

Study subjects

Pregnant women registered for antenatal services during the period of January till December of 2012. To enter this study the cases must be singleton pregnancy and have not been diagnosed with inherited hematological disease like sickle cell anemia or thalassemia.

The study design

Cross-sectional study (record based).

Sample size

372 pregnant women calculated based on prevalence of 41% with precision 0.5 % and confidence interval of 95%.

Sampling technique

Using a systematic random sampling method, every first out of tow registered name was selected to enter the study.

The data collection

Data was collected from a sample of antenatal records of all pregnant women registered for antenatal services during the period of January till December of 2012. The record of 372 pregnant women were reviewed and data obtained included the age, parity, gestational age at booking(first visit), occupational status, educational level and hemoglobin concentration at booking.

Data management and analysis

There was a cross-tabulation of various variables: age, parity, gestational age, and educational level against hemoglobin concentration profile. Data analysis was done by SPSS software version 11. Pearson's chi-square test was used to evaluate the effect of the study variables on the hemoglobin concentration profile at the 95% confidence level.

The hemoglobin level of < 11 g/dL was considered anemia. Anemia severity was considered according to WHO criteria to mild (10.0-10.9), moderate (7.0-9.9) and severe (< 7).

Ethical considerations

Approval to conduct the research was obtained from the higher research and ethical committee in research center of Prince Sultan Medical Military City in Riyadh.

RESULTS

Table 1: socio-demographic characteristics of the pregnant women enrolled in the study in ALWAZARAT health center in PSMMC, KSA

Socio-demographic	No (n=372)	%
Educational level		
<High School	85	**22.8**
High School	139	**37.4**
University	148	**39.8**
Occupational status		
Non working	323	**86.8**
Working	49	**13.2**
Age group		
<25	88	**23.7**
25-34	216	**58.1**
35+	68	**18.3**
Trimester		
First(1-12weeks)	192	**51.6**
Second(13-27weeks)	133	**35.8**
Third(>=28 weeks)	47	**12.6**
Parity in groups		
Nulliparous(0)	127	**34.1**
Multiparous(1-4)	205	**55.1**
Grand multiparous(>=5)	40	**10.8**

In the study group of 372 pregnant women, the mean age was 29.31±5.81 with about 88 (23.7%) were below the age of 25 years, 216 (58.1%) between the age of 25 to 34 years and 68 (18.3%) at or above the age of 35 years. The mean gestational age at booking was 15.15±8.76 with the range of 4 to 40 weeks. One hundred twenty-seven (34%) of the study group were nulliparous, 205 (55.1%) multiparous where as 40 (10.8%) were grand-multiparous. The education level for the study group was below high school in 85 (22.8%), high school in 139 (37.4%) and university in 148 (39.8%). And only 49 (13.2%0) women were working where as 323 (86.8%) were not employed, (Table 1, 2). Seventy-six (20.4%) of the study group were anemic (hemoglobin level < 11 g/dl). Out of which, 47 (12.6%) were mildly anemic, 28 (7.5%) were moderately anemic and only one case (0.3%) were severely anemic, (Figure 1). The prevalence of anemia increased significantly with increased gestational age (P= 0.000), and noticed that 13% of the women in the first trimester were anemic compared to 23.3% and 42.6% in the second

and third trimester, respectively (Table 3). The women age, parity and educational level did not affect the hemoglobin level of the pregnant women in this study (*P*> .05).

Table 2: Characteristics distribution of the study variables of the pregnant women enrolled in the study in ALWAZARAT health center in PSMMC, KSA

Characteristics	Mean±SD	Median	Min/Max
Age	29.31±5.81	29	18/45
Parity	1.76±1.94	1	0/9
Hemoglobin Level	11.85±1.28	11.95	6.7/16.4
Gestational age	15.15±8.76	12	4/40

Table 3: prevalence of anemia by the study variables (educational level, working status, age, gestational age and parity) among pregnant women at ALWAZARAT health center in PSMMC, KSA

Socio-demographic	No	Anemia				Chi square	P-value
		Yes (n=76)		No (n=296)			
		No	%	No	%		
Educational level							
<High School	**85**	14	**16.5**	71	**83.5**	5.301	**0.071**
High School	**139**	23	**16.5**	116	**83.5**		
University	**148**	39	**26.4**	109	**73.6**		
Occupational status							
Working	**49**	11	**22.4**	38	**77.6**	0.141	**0.707**
Non working	**323**	65	**20.1**	258	**79.9**		
Age group							
<25	**88**	20	**22.7**	68	**77.3**	0.394	**0.821**
25-34	**216**	43	**19.9**	173	**80.1**		
35+	**68**	13	**19.1**	55	**80.9**		
Trimester							
First	**192**	25	**13.0**	167	**87.0**	21.312	**0.000**
Second	**133**	31	**23.3**	102	**76.7**	.	
Third	**47**	20	**42.6**	27	**57.4**		
Parity in groups							
Nulliparous	**127**	33	**26.0**	94	**74.0**	4.380	**0.112**
Multiparous	**205**	34	**16.6**	171	**83.4**		
Grand multiparous	**40**	9	**22.5**	31	**77.5**		

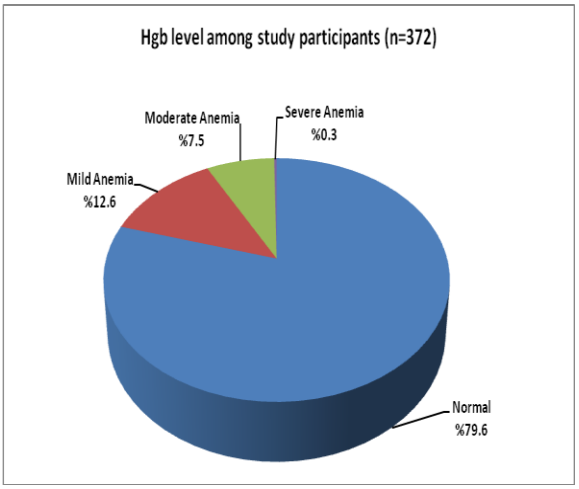

Figure 1: severity of anemia among pregnant women at ALWAZARAT health center in PSMMC, KSA:

DISCUSSION

The prevalence of anemia of 20.4% among pregnant women in this study is lower than the findings in similar studies done in deterrent regions in Saudi Arabia. Earlier in 1994 the prevalence of anemia was 31.9% in the Southern region, [25] compared to higher prevalence of 41.3% in Eastern region in 2008. [24] The higher prevalence in the eastern region can be attributed to the endemicity of sickle cell anemia (trait and disease). Also the study finding is lower than prevalence found in some Gulf countries like Kuwait 36.8% [27] and Oman 43.6%. [28] Other Asian countries showed higher prevalence of pregnancy anemia compared to our study, like in Malaysia 34.6% [29] and Vietnam 43.2%. [30] Lager studies done in India [31] and Bangladesh [32] reported higher prevalence of anemia of 84.9% and 50% respectively, reflecting a poor state of the nutritional health among pregnant women in these developing countries. In developed countries, studies showed lower prevalence of pregnancy anemia compared to developing countries. An example to that was the prevalence in the United States found to be 22% [33] indicating an improved economical status of the community and good nutritional support to pregnant women in those counties. In this study, most of the anemic pregnant women were in the mild degree 12.6%, whereas 7.5% in the moderate degree and 0.3% in the severe degree of anemia. In our study, we found that the advancing gestational age is

significantly increased the risk for anemia, which is similar to the findings in the other study in conducted in Saudi Arabia. [24,25] Compared to the first trimester, more cases of anemia found in the second and third trimesters possibly attributed to the hemodilution and plasma expansion that occur physiologically with advancing gestational age. [5] The age and parity were not associated with significant statistical change in the hemoglobin level and were not considered risk factors for anemia in this study. Also, there was no significant relation found between the level of education and occupational status against the level of hemoglobin and this finding was consistent with the observations in previous studies conducted locally and regionally. [24,25] Anemia during pregnancy can result from many causes, including iron and folate deficiency, hemoglobinopathies and infections like malaria, hookworm infestation and HIV. [16,17] Nutritional anemia, mainly iron deficiency anemia, is considered the most common cause of anemia in pregnancy. [18] Therefore a successful treatment is usually achieved by supplementation with iron and folic acid with no need for further investigation of the cause of anemia. And this might explain the lack of further information in the records of pregnant women in this study regarding the specific causes of anemia. This study was limited by its reliance on the records of the antenatal care of pregnant women and we could not establish a specific causation of the anemic cases. Also limited by being conducted in one health care center in the Riyadh region that provides a well organized and good quality antenatal service. And this might be the cause for low prevalence of anemia among the study group.

CONCLUSION

Although the prevalence of anemia in this study is low compared to other studies in Saudi Arabia, anemia is still a significant problem facing the pregnant women and jeopardizing their outcomes.

RECOMMENDATIONS

To increase the efforts toward the health education of women in childbearing age regarding the importance of preconception care regarding adequate intake of iron-rich dietary sources and supplementation with iron and folic acid. Other recommendation during pregnancy aims to early detect and treat the anemia before delivery. Further study is needed to include more primary health care centers and cover a higher proportion of pregnant women in Riyadh region. Also a prospective study needed with emphasis on the common etiology of anemia in pregnancy in our region.

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