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Original Research Article

Prevalence of Anemia among Pregnant Women Attending Antenatal Clinic of a Selected Hospital in Accra, Ghana

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ABSTRACT

Background: Anemia troubles about half of Ghanaian grown-up population and its highest value over the past 16 years was 56.40% in 2011, while its lowest value was 49.20% in 1999.
Objective: To determine the prevalence of anaemia among pregnant women attending antennal clinic of a selected private hospital in Accra, Ghana.
Methodology: Using across-sectional design, 200 consenting participants were selected for the study. Hemoglobin levels were assessed. Maternal age, gestational age, parity and number of antennal visits were collected from the antenatal record booklet. Data were analyzed using the SPSS programme IBM version 20. Chi-square was used to investigate the association between independent variables and prevalence of anemia. The data were further analyzed using binary logistic regression methods to evaluate possible risk factors associated with anemia. Odd ratio was reported to establish the risk of anemia and 95% confidence interval were estimated. A $p<0.05$ was considered as statistically significance.
Results: The findings revealed that, the mean with ± standard deviation of hemoglobin value was 10.9±1.3 (95% [confidence interval] =10.7–11.1), and the overall prevalence of anemia from a total of 200 study subjects was 102 (51.0%). The severities of all diagnosed anemia cases were mild (60.8%) to moderate (39.2%). Severe anemia was not found in any of the participants.
Conclusion: The study established that the prevalence of anemia was high and it is associated with parity. Preventive efforts targeting preconception nutrition and promotion of regular antenatal care visit throughout the normal pregnancy is urgently required.
Key words: Pregnant Women, Hemoglobin, Trimester, Antenatal Care, Anemia

INTRODUCTION

Globally, the mean blood hemoglobin concentration was 11.1 g/dl. [1] (Stevens et al., 2013).Anemia resulting from iron deficiency adversely affects cognitive and motor development, causes fatigue and low productivity. [2,3] and, when it occurs in pregnancy, may be associated with low birth weight and increased risk of preterm delivery. [4,5,6,7] The mechanisms causal to these effects are unknown, but they may be related to reduce oxygen delivery to the placenta and fetus, increased rates of infection, or adverse effects of iron deficiency on brain development. [8,9,10]

Anemia is one of the most prevalent nutritional deficiency problems affecting pregnant women. The prevalence of anemia in pregnancy differs significantly because of variations in socioeconomic conditions, lifestyles, and health-seeking behaviors across different cultures. [11,12,13] The World

Health Organization (WHO) estimates that 52% of pregnant women in developing countries are anemic compared with 23% in the developed world. [14] Anemia has also been recognized as one of the greater risk of perinatal mortality and morbidity. [15] Accumulating information suggests an association between maternal iron status in pregnancy and the iron status of infants postpartum. [16,17]

Anemia troubles about half of Ghanaian grown-up population. Its highest value over the past 16years was 56.40% in 2011, while its lowest value was 49.20% in 1999. [1] The raise in its prevalence will occur largely in pregnant women. Anemia is defined as decrease in the total amount of red blood cells. [18,19] ORA decrease in whole-blood hemoglobin concentration of more than two standard deviations below the mean of an age- and sex-matched reference range. [20] Inadequate folate during pregnancy has long been associated with reduced fetal growth and anemia in pregnancy. [21,22]

Over the years, the proportions of iron-deficiency anemia in pregnancy have lingered high in women in developing as well as developed countries. [23,24,25] Its often occurs toward the end of pregnancy even among women who enter pregnancy with some iron stores. [26,27] It is far more common than iron-deficiency anemia. Iron-deficiency and iron-deficiency anemia are related to reduce iron stores in newborns. [28] The nine months of pregnancy characterize the most intense period of growth and development humans ever experience. How well these processes go depends on many factors, most of which are modifiable. Of the factors affecting fetal growth and development that are within our control to change, nutritional status stands out. [29]

At no other time in life are the benefits of optimal nutritional status more obvious than during pregnancy. Many aspects of nutritional status, such as dietary intake, supplement use, and weight change, influence the course and outcome of pregnancy. [8,9,30] The fetus is not a parasite; it depends on the mother's nutrient intake to meet its nutritional needs. [31] Periods of rapid growth and development of fetal organs and tissues occur during specific times throughout pregnancy. Vital nutrients must be accessible in required amounts during these times for fetal growth and development to proceed optimally. [32,33]

Pregnancy is a molecule-building process and a woman's normal nutritional requirement increases during pregnancy to meet the needs of the growing fetus and the maternal tissues associated with pregnancy. [34] If energy and other nutrient intake do not enhance, the body's own reserves are used, leaving a pregnant woman weakened. Energy needs increase in the second and particularly the third trimester of pregnancy, mainly due to increased maternal body mass. [35]

The study has the following objectives

1. To determine the prevalence of anemia among pregnant women attending antennal care in a selected private hospital in Accra, Ghana.
2. To determine prevalence of anemia and its association with maternal age, gestational age, parity and number of antenatal care visit.

METHODOLOGY

Study Designs

A cross sectional study included pregnant women aged between 15-44 years attending antenatal clinic in a selected private hospital in Accra, Ghana were eligible to participate in the study. Subjects were informed and their consent was sought. Participants were recruited when they arrived for routine antenatal clinic. Required information on age, level of education, gestational age of the pregnancy, parity and the number of antenatal visits was obtained from interview and antenatal record booklet to gather with current hemoglobin estimation test.

Sample Size and Sampling Method

The sample size was calculated using (Fisher, 1978):

$N= Z^2 * P (1 – P) / d^2$, where N = sample size

Z = score for 95% Confidence Interval which is 1.96

P=prevalence of hypertension (proportion of people with hypertension presume to be 14% or higher).

q=1-p (proportion of people without hypertension) d = tolerable error set at 5%. N =185.01 making 8% allowances for losses, it was approximated to 200.

Sampling Method

Facility based quantitative cross-sectional study was employed from January to August, 2017 at selected private hospital located on Adenta-Dodowa road. The study was designed to be performed over 24 weeks during which estimated 400 women were expected to attend outpatient clinic from January 2016 and August, 2017. The systematic random sampling method was used to select the study participants, at fixed intervals (k = sampling interval: 400/200= 2). Pregnant women who were not lately been given blood or transfused, who had no chronic medical diseases and who had no early bleeding were included in the study. Each participant was recruited only once on their first visit during the study period.

Statistical Analysis

Data were analyzed using the SPSS programme IBM version 20. Descriptive statistics were calculated for all numerical parameter. Continuous variables are stated in mean standard deviation. Cross tabulation were done to determine percentages .Chi-square were used to investigate the association between independent variables and prevalence of anemia. The data were further analyzed using binary logistic regression methods to evaluate variables associated with anemia. Odd ratio (OR) was reported to establish the risk of anemia and 95% confidence interval (C.I.) were estimated. A $p<0.05$ was considered as statistically significance.

RESULT

Table 1 presents results on the percentage distribution of anemia and maternal age, level of education, gestational age, parity and number of visit among the study participants Results indicate that moderate anemia was higher among age (35-44)years representing 23.2%. Prevalence of moderate anemia was low among those tertiary (4.8%) as compared to its counterparts. Prevalence moderate anemia was also found to decrease as the gestational age increases, showing the highest prevalence in the first trimester 21.4% than second 20.0% and third trimester 19.8%. Pregnant women with more than four children had shown more prevalence of moderate anemia (23.1%) than its counterparts. Prevalence of moderate anemia was also found to decrease as the participant number of visits increases, showing the lowest prevalence in more than eight visits11.5%, four to seven visits 20.7% and less or equal to three visit 21.7%.

Table 1 showing the percentage distribution of anemia and maternal age, level of education, gestational age, parity and number of visit among the study participants

Variables	Anemia			No. of subject
	Moderate	Mild	Non	
Maternal Age		**Chi-Square** =10.737, **P=0.097**		
15-24	3(15.0)	7(35.0)	10(50.0)	20 (10.0)
25-34	24(19.4)	39(31.5)	61(49.2)	124(62.0)
35-44	13(23.2)	16(28.6)	27(48.2)	56(28.0)
Level of Education		**Chi-Square= 0.196, P=0.0978**		
Primary & Below	19(20.4)	25(26.9)	49(52.7)	93(46.5)
JHS	15(24.6)	20(32.8)	26(42.6)	61(30.5)
SHS	5(20.0)	12(48.0)	8(32.0)	25(12.5)
Tertiary	1(4.8)	5(23.8)	15(71.4)	21(10.5)
Gestational Age		**Chi-Square = 0.703, P= 0.951**		
1st Trimester	3(21.4)	5(35.7)	6(42.9)	14(7.0)
2ndTrimester	17(20.0)	24(28.2)	44(51.8)	85(42.5)
3rdTrimester	20(19.8)	33(32.7)	48(47.5)	101(50.5)
Parity		**Chi-Square =11.753, P<0.019**		
No Child	9(15.5)	11(19.0)	38(65.5)	58(29.0)
1 Child	10(18.9)	16(30.2)	27(50.9)	53(26.5)
2 Children	15(26.8)	20(35.7)	21(37.5)	56(28.0)
3 Children	3(15.0)	9(45.0)	8(40.0)	20(10.0)
≥4.0 Children	3(23.1)	6(46.2)	4(30.8)	13(6.5)
Number of Antenatal Care Visit Chi-Square =7.014, P=0.135				
≤ 3 times	20(21.7)	30(32.6)	42(45.7)	92(46)
4-7 times	17(20.7)	28(34.1)	37(45.1)	82(41.0)
≥8 times	3(11.5)	4(15.4)	19(73.1)	26(13.0)
1st ,2nd&3rd Trimester9(0-12), (13-27)& (28-40) weeks respectively				

Table 2 presents results on the percentage distribution of hemoglobin level among the study participants. In terms of gravity, mild anemia was 60.8%, moderate anemia was 39.2% and severe anemia was 0.0%.

Table2: Percentage distribution of Hemoglobin level among the study population.

Hemoglobin level(g/dl)	Percentage	No. of Subject
Severe Anemia (≤7)	0.0%	0
Moderate Anemia (7-9.9)	39.2%	40
Mild Anemia(10.10.9)	60.8%	62
Non-Anemia (≥11)	49.0%	98

Table3: Mean Hemoglobin estimation among Pregnant Women

Gestational Age	Mean± Std. Deviation	No. of Subject
1st Trimester	10.643±1.2283	14
2ndTrimester	10.959±1.3924	85
3rdTrimester	10.895±1.2956	101

Prevalence of Anemia

The mean ± SD hemoglobin concentration was 10.9g/dl ± 1.33 and an overall prevalence rate of anemia with hemoglobin level <11 g/dl was 51.0% (CI: 10.7-11.1).

Table 4: Biological data and Interpreting Hemoglobin

Variable	**Range**		**Mean**	**Std. Dev**
Hemoglobin **((g/dl))**	7.3 - 15.3		10.90	1.33
Interpreting hemoglobin	**Anemia**	**Number**	**%**	**Standards**
	< 11	102	51.0%	12-16
	≥ 11	98	49.0%	

A person with hemoglobin below <11 g / dl is anaemic according to World Health Organisation. [1]

Binary Logistic Regression Risk Factors Analysis for Anemia

The results of binary logistic regression analysis, including the odds ratio for maternal age, gestational age, parity and number of visit are presented in table 8. Significant association was related to 4-7 times antenatal visit (p<0.006), other factors like maternal age, gestational age, parity were also analyzed but no significant associations were found.

Inferential Statistics

Table 5 shows that participants who were aged 35-44 were 1.057 times more likely to be anemic than those who were below the age of 35 years. However the rate of moderate anemia increases with increases in age and vice versa from mild anemia as shown in table 1. The gestational age between 28-40 weeks were 1.832 times more likely to be anaemic than those who were below. Participants with three or more children were 1.874 times more likely be anaemic than those who were below. The number of antennal visits revealed no positive association with prevalence of anemia.

Table 5: Association between prevalence anemia and maternal age, gestational age, parity and number of visit

Parameters	Odd ratio [95% CI]	p-value
Age (years)		
15-24	1.0	
25-34	0.971 [0.361-2.610]	0.954
35-44	1.057 [0.357-3.128]	0.920
Gestational Age		
0-12	1.0	0.258
13-27	1.395 [0.383-5.082]	0.614
28-40	1.832 [0.884-3.797]	0.104
Parity		
≤3 Children	1.0	
≥3 Children	1.874[0.823-4.267]	0.135
No. of Visit		
0-3	1.0	
4-7	0.189[0.061-0.592]	0.006
≥8	0.244[0.089-0.667]	0.135

DISCUSSION

Prevalence of Anemia

Antenatal care allows management of pregnancy, detection and treatment of complications, and promotion of better maternal and child health. [36] However, women rarely recognize childbearing as problematic and, there-fore; do not seek care. [37] This study recognized anemia as a major health problem among pregnant women in Ghana. In the *present study*, 51% of the participants are found to be anemic.

This figure is slightly lower compared to World Bank report in 2016 on prevalence of anemia which was given as 54% among pregnant women in Ghanaian population. [1] Similar results were reported on prevalence of anemia among pregnant women in previous studies. [38,39] The higher prevalence may be due to inadequate dietary iron intake and lack of proper nutrition during preconception period. In this study, about one in every two pregnant women experiences iron-deficiency anemia during pregnancy. The present study indicated that moderate anemia (39.2%) constitutes a significant portion of anemia in pregnant women attending the antenatal clinics.

Maternal Age and Anemia

Statistical significance association between parity and anemia was found (p<0.097). This is inconsistent with Chowdhury and colleagues who reported association of anemia with maternal age. [13] When maternal age was considered (Table 1), we observed that moderate anemia increases along with increases maternal age and vice versa for mild anemia.

Gestational Age and Anemia

Gestational age of the pregnancy were important parameters but have revealed no statistical significance association with anemia in the current study (P= 0.951). Some studies have reported results of the association between gestational age and anemia. [40,41,42] The present study revealed high proportions of mild and moderate anemia combine in first trimester and reaches the lowest rate at the end of second trimester and increase in third trimesters as indicated in table 1.

This finding is consistent with a study conducted by Vemulapali and Roa, 2014in Andhra Pradesh reported that pregnant women in first trimester showed higher anemia prevalence rate than in second and third trimesters**.** [43] But inconsistent with a study which reported on prevalence of anemia among pregnant women in rural population of Kolar in district. [44]

As pregnancy progresses, plasma volume progressively increases and most of this increase occurs by 34 weeks' gestation and is proportional to the birth weight of the baby. Because the expansion in plasma volume is greater than the increase in red blood cell mass, there is a fall in haemoglobin concentration, haematocrit and red blood cell count. [28,45]

Parity and Anemia

Statistical significance association between parity and anemia was found (p<0.019). Similar result was reported on association of anemia with parity. [46] Concerning parity (Table1), it was observed in this study that moderate anemia was less common (15.5%) in primigravidas as compare to 18.9%-26.8% for multiparas, while mild anemia followed the same trend, 19.0% anemia in primigravidas and 30.2%-46.2% anemia in multiparas.

Several studies have observed higher prevalence of anemia in women with high parity. [14,46] Likely rationalization to the high prevalence of anemia among multiparous women is that these women might have gotten pregnant with low levels of nutrients due to the reduction of reserves of the mother in prior pregnancies and lactation periods or possibly did not also allow spaces between their pregnancies so were not fully recovered from previous anemia.

Number of Antenatal Care Visit and Anemia

Statistical significance association between number of antenatal visit and anemia was not found (P=0.135).Regarding number of antenatal visit (Table1) it was observed in this study that prevalence of moderate anemia decreased with increased number of visit. This indicates that regularly routine checked of hemoglobin might have prompted the women to eat well and also supplements that are given monthly might have played significant role in reducing anemia in pregnant women who visit regularly**.**

The results of our study showed that level of education of mothers had a significant association with maternal anaemia. This finding is supported by another study *i*n which literacy of women had a significant association with the use of antenatal care services, as education has an impact on awareness of use of health services among the population. [47]

Mean Hemoglobin estimation among Pregnant Women

The current study demonstrates that mean hemoglobin levels decreased during the first trimester and attained its highest peak at the end of second trimester, and decreases again during the third trimester of pregnancy as shown in table 3. This finding is inconsistent with a research that has revealed that hemoglobin concentrations

typically decrease during the first trimester and reach the lowest levels at the end of second trimester and increase again during the third trimester of pregnancy. [48] It is evident that, the significant declined of hemoglobin level in pregnant women is due in part to dietary iron deficiency, therefore iron therapy is helpful to maintain hemoglobin nearer to that of normal women. [49]

CONCLUSION

- The study established high prevalence of anemia and it was associated with parity
- Hemoglobin appears to increase with advancing pregnancy, which suggests the mild risk of anemia in pregnancy
- Prevalence of anemia decrease with increase number of antenatal care visit.

RECOMMENDATION

Pregnant women should be educated on adequate healthy dietary intake to maintained normal hemoglobin levels. In a unique effort to prevent this problem, pregnant women should encourage to attending antenatal care more often to decrease the incidence of anemia. Finally women should be advised to take 30–60 mg of iron along with folic acid in a supplement.

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