Original Article

Prevalence of Anemia among Pregnant Women Attending Ante-Natal Clinic in a Tertiary Health-Care Facility: A Study in an Area Under Insurgency in Northeastern Nigeria

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Abstract

Context: Anemia in pregnancy is a very common event in the developing world. Pregnancy is associated with high nutritional demands which may culminate in third-trimester anemia. Most studies conducted on the prevalence of anemia in North Eastern Nigeria were before the onset of the current insecurity. **Aims:** The aim of this study is to determine the prevalence of anemia among women in the third trimester of pregnancy attending Antenatal Clinic in the Federal Medical Centre, Nguru, Yobe State, Nigeria. **Settings and Design:** A cross-sectional descriptive study involving 200 women in the third trimester of pregnancy. **Subjects and Methods:** Semi-structured questionnaires were utilized to collate age, parity, and date of last child birth (LCB). Hematocrit levels were determined using an automated hematology analyzer. Hematocrit levels were stratified according to the World Health Organisation's classification as follows: <21.0%-severe, 21.0%–29.9%-moderate, 30.0%–32.9%-mild anemia, and ≧33.0%-not anemic. Data were analyzed using SPSS version 20.0. Continuous variables were summarized using means and standard deviations. Chi-square and Pearson correlation analyses were conducted to determine relationships. A value of $P \leq 0.05$ was considered statistically significant. **Results:** The mean age, parity, LCB, and hematocrit of the study participants were 26.35 ± 6.17 years, 3.72 ± 2.75, 2.03 ± 1.62 years, and 32.64 ± 7.06%, respectively. The overall prevalence of anemia (hematocrit <33%) was 46.5% with mild, moderate, and severe anemia present in 40 (20%), 39 (19.5%), and 14 (7.0%), respectively. The Pearson correlation analysis between parity and hematocrit levels was weak, negative, and statistically significant ($r = -0.144$, $P = 0.042$). Chi-square analysis revealed a significant relationship between parity and anemia ($\chi^2 = 13.166$ (df, 6), $P = 0.039$). **Conclusion:** The prevalence of the third-trimester anemia in Northeastern Nigeria is of severe public health significance and is associated with parity.

Keywords: Anemia, insurgency, Northeastern Nigeria, pregnancy

Introduction

Africa has the highest prevalence of anemia in pregnant women in the world.[1] Anemia is more pronounced during the third trimester because of increased fetal demand (300 mg), increase in maternal red blood cell mass (450 mg), placental (90 mg), and maternal basal iron loss (230 mg).[2] The WHO defines anemia in this group as a hematocrit of <33%.[3] The WHO has stratified prevalence of anemia into different categories of public health significance as follows; <4.9%-normal, 5.0%–19.9%-mild, 20.0%–39.9%-moderate, and ≥40%-severe.[3]

Anemia in pregnancy may mostly be due to physiological changes in pregnancy as characterized by increased demand for iron and folic acid alongside marked increase in plasma volume without a corresponding increase in red cell mass. However, this does not preclude other causes or intercurrent illnesses as etiological factors.

Insurgency is a violent attempt to oppose a country's government carried out by citizens of that country.[4] Thus, it results in many adverse effects such as poverty, malnutrition as well as maternal, and pediatric anemia among vulnerable

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groups. Insurgencies may lead to displacement of people from their places of abode. This may lead to limited access to food which may result in malnutrition. One of the presentations of malnutrition is anemia. Even in the absence of insurgency, anemia in pregnancy is a global health problem affecting more than half of all pregnant women worldwide.[5] The high prevalence of anemia has been associated with low socioeconomic status.[6] Maternal anemia may be compounded by vomiting, decreased intake as well as nonintake of nutritional supplements during pregnancy. Other factors include frequent pregnancies associated with short intervals leading to maternal depletion in which successive pregnancies result in worsening iron depletion and birth outcomes.[7]

In settings of security challenges, mothers will not get what they want or require to eat due to none availability. Heads of households are unable to provide nutritionally enriched food to their pregnant spouses due to unemployment while those that are employed are unable to leave their houses due to insecurity. In addition, farmers may be displaced from their settlements and as such cannot farm due to the lack of access to their farms. Furthermore, mothers may be anorexic due to great psychological stress common during strife. Nutritional supplementation for mothers with iron and folic acid is the practice in all clinics in almost all countries as recommended by the WHO.[8] However, some mothers attend antenatal clinics (ANCs) for the first time in the third trimester whereas others have reduced or absent compliance due to the side effects of these drugs.

Most studies conducted on the prevalence of anemia in the North East of Nigeria were before the onset of the current insecurity. Therefore, this study was to determine the current prevalence of third-trimester anemia in a tertiary hospital (Federal Medical Center (FMC) Nguru, Yobe State) situated in a conflict zone and the direct impact of such conflicts on the previous prevalence.

Subjects and Methods

This was a cross-sectional descriptive study involving 200 women in the third trimester of pregnancy, over a 5-month period (August to December 2015). It was conducted in the ANC of the FMC Nguru, Yobe State, Nigeria. Participants were enrolled during the ANC visits using a convenience sampling technique. Following the acquisition of institutional ethical committee approval and informed consents from the participants, semi-structured questionnaires were utilized to collate data on age, parity and date of last childbirth (LCB). Only women in the third trimester with singleton pregnancies were enrolled in the study. The third trimester was defined as estimated gestational ages between 29 and 40 weeks based on ultrasound scan.

Participants were stratified into three groups based on parity; primip-1, multipara 2–4, and grand multi 5 and above. Those with a history of either cough of >3 weeks' duration, HIV positivity, the presence of sugar in the urine, history of diabetes or hemoglobin SS were excluded from the study. Blood film was done to rule out those with leukemia and toxic granulation and also for morphological classification. Hematocrit levels were analyzed using Mindray Shenzhen automated hematology model 3200 analyzer. Hematocrit levels were stratified according to the WHO classification as follows: <21.0%-severe, 21.0%–29.9%-moderate, 30.0%–32.9%-mild, and ≥33.0%-not anemic.

Data were analyzed using SPSS version 20.0, 2011 Armonk, NY, IBM Corp. Continuous variables were summarized using means and standard deviations. Chi-square and Pearson correlation analyses were conducted to determine relationships. In addition, 95% Confidence Intervals (CIs), the coefficient of determination (r^2) and Cramer's V were computed. Level of significance was set at $P \leq 0.05$.

FMC Nguru, Yobe State is in Northeastern Nigeria. It is located at latitude 12.8°N and longitude 10.5°N, respectively. Yobe State shares boundaries with Jigawa and Bauchi States to the South-West, Borno State to the East and the Niger Republic to the North. The hospital is a Tertiary Health Centre, providing services to all local governments in the State and the Southern part of Niger republic. Yobe, Borno, Adamawa, Bauchi States were affected by the insurgency leading to displacement, loss of lives, and properties.

Results

The mean age, parity, LCB, and hematocrit of the study participants were 26.35 ± 6.17 years (95% CI 25.35, 27.08 years), 4.0 ± 3.0 (95% CI 3.0, 4.0), 2.03 ± 1.62 years (95% CI 1.81, 2.26 years), and 32.64 ± 7.06% (25% CI 31.28%, 33.45%), respectively [Table 1]. Most 125 (62.5%) (95% CI 55.3%, 70.6%) were booked for ANC in the third trimester whereas the remaining 75 (37.5%) booked in the second trimester. While the overall prevalence of anemia was 93 (46.5%) (95% CI 40.4%, 52.6%); mild, moderate and severe anemia were present in 40 (20.0%), 39 (19.5%), and 14 (7.0%), respectively. More grand multipara had severe anemia compared to primipara and multipara [Figure 1]. Majority of the women had normocytic normochromic anemia 130 (65.0%), 50 (25.0%) had microcytic hypochromic anemia, 10 (5.0%) had macrocytic anemia and the remaining 20 (10.0%) had dimorphic blood

Table 1: Maternal hematological parameters (*n*=200)

Hematological variables	Mean±2SD	95% CI	Range
Hematocrit (%)	32.64±7.06	31.65-33.62	6.20-50.50
Total WBC count (×10⁹/l)	11.83±4.72	11.17-12.49	4.50-28.30
Platelet count (×10⁹/l)	304.82±134.00	286.13-323.51	45.0-968.0
MCV (fl)	89.97±7.33	79.75-100.20	27.90-111.0
MCH (pg)	29.74±2.74	27.42-28.43	17.60-41.00
MCHC (g/dl)	32.43±2.03	32.14-32.71	26.6-42.70
Reticulocyte count (%)	1.81±0.93	1.68-1.94	0.4-2.5

SD: Standard deviation, CI: Confidence interval, WBC: White blood cell, MCH: Mean cell hemoglobin, MCHC: Mean cell hemoglobin concentration, MCV: Mean corpuscular volume

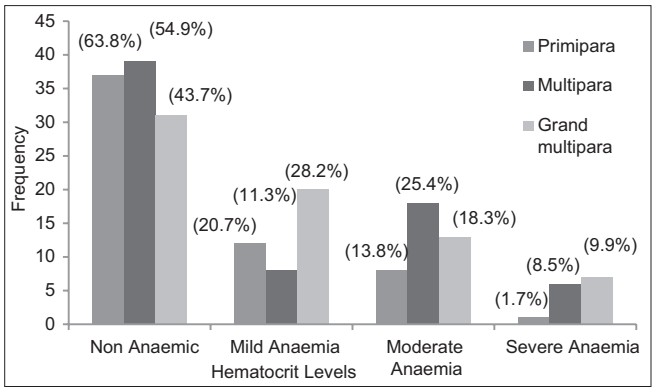

Figure 1: Distribution of hematocrit levels by parity among 200 women

picture on film. 136 (68.0%) have normal mean corpuscular volume (MCV), 50 (25.0%) have low MCV and remaining 14 (7.0%) had a high MCV. The Pearson correlation analysis between parity and hematocrit levels was weak, negative, and statistically significant ($r = -0.144$, $P = 0.042$; $r^2 = 0.021$). Pearson correlation analysis between LCB ($n = 88$) and hematocrit levels was weak, positive, and not statistically significant ($r = 0.064$, $P = 0.556$; $r^2 = 0.004$). Chi-square analyses revealed a significant relationship between parity (primip-1, multipara 2–4, and grand multi ≥5) and hematocrit (<21.0%-severe, 21.0%–29.9%-moderate, 30.0%–32.9%-mild, and ≥ 33.0%-not anemic) ($\chi^2 = 13.166$ [df = 6], $P = 0.039$, Cramer's V = 0.181). More grand multipara had severe anemia compared to primipara and multipara; 7 (9.9%) versus 1 (1.7%) versus 6 (8.5%), respectively [Figure 1].

Discussion

The WHO has stratified prevalence of anemia into different categories of public health significance as follows; ≤4.9%-normal, 5.0%–19.9%-mild, 20.0%–39.9%-moderate and ≥40%-severe.[3] The overall prevalence of anemia in this study is very high and consistent with the WHO stage of severe public health significance.[3] Our findings although higher than those of Koyuncu *et al*.[9] in Turkey are lower than those of El-Ashim *et al*.[10] in Egypt in third-trimester pregnant women. In addition, the finding of a higher proportion of severe anemia in this study compared to an earlier study by Kagu *et al*. in the same region may be connected to the general insecurity which destroys the land, water, biological and social resources for food production.[11] Other possible contributory factors may be low literacy levels and general lack of reproductive health awareness.[12]

Food insecurity is one of the factors that can contribute to the high prevalence of anemia among pregnant women. Food availability is reduced because of the destruction of food stores and this leads to severe food shortages, mass starvation with nutrient deprivation as a result of the elimination of a single growing season.[12,13] This is in addition to socioeconomic and demographic factors which have been linked to mild and moderate anemia.[14] Interestingly, Kagu *et al*. (2007) reported higher figures compared to our findings in women attending their first antenatal in the same area before the present insurgency.[11] This suggests that other factors apart from the insurgency may be responsible. It is also important to note that their sample size was larger and their study was done when the environment was peaceful and clinic attendance possibly higher. In addition, it is possible that the women were not eating well as a result of hyperemesis and also were yet to commence any nutritional supplements. The burden of anemia in our study although similar to that reported in Mali by Ayoyu *et al*.[15] is lower than that reported by ElZahaf *et al*.[16] in Libya. These are areas that have also faced insurgencies.

The mean PCV from our study was similar to the findings of Babadoko *et al.* (2014)[17] in a previous retrospective study among the same population. However, they did not stratify their study participants based on the severity of anemia as we have done. Hence, the prevalence and magnitude of anemia cannot be established from their study. Severe anemia among pregnant women is associated with a myriad of complications which include maternal cardiovascular diseases, reduced physical and mental performance, lack of immunity, and unavoidable fatigue. Intrauterine growth retardation and fetal death may also complicate such pregnancies. Anemic mothers may not be able to withstand the rigors of labor and as such prolonged labor and its attendant consequences may result. Although early diagnosis and treatment are key in reducing maternal morbidity and mortality we believe that a bottom-up approach and tackling socioeconomic factors contributing to maternal anemia will be more appropriate.

The association between parity and anemia in this study is expected. This is because repeated conception without adequate spacing will lead to maternal depletion syndrome. This may be because such mothers with short inter-pregnancy intervals may not have had sufficient time to replace nutrients used in the previous pregnancy.[18]

Conclusion

The high overall prevalence of third-trimester anemia in Northeastern Nigeria is of severe public health significance and is associated with parity. The limitation of this study is its hospital-based nature. This is because a widespread study is not feasible due to the current security situation in this region. We recommend further studies to determine the cause(s) of this high prevalence as the majority showed a microcytic or macrocytic picture on blood film.

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Conflicts of interest

There are no conflicts of interest.

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