Prevalence of Iron Deficiency Anaemia (IDA) among Pregnant Women Attending a Tertiary Health Care Facility in North-eastern Nigeria

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Abstract

Background: Iron Deficiency Anaemia (IDA) is the most frequent nutritional deficiency in the world and it is most prevalent in African countries including Nigeria. In pregnant women, JDA is associated with high morbidity and mortality.

Aim: This study was to determine the prevalence and some associated risk factors for IDA in the third trimester.

Materials and methods: This was a cross-sectional descriptive study involving 88 women in the third trimester of pregnancy attending Antenatal Clinic (ANC) of Federal Medical Centre in Nguru, Yobe State, North-East, Nigeria. Complete Blood Count (CBC) and serum ferritin were analysed and relation of serum ferritin with some variables were determined.

Results: The mean age, parity, last child birth, haematocrit and ferritin of the study participants were 26.72±6.12 years, 3.58±3.43, 1.89±1.85 years, 32.51±7.41% and 68.87±151.88 ng/ml respectively. Overall prevalence of anaemia was 22/88 (25%) with the prevalence of iron deficiency (ID) being 53/88 (60.2%); 10/88 (11.4%) had IDA while ID without anaemia was present in 43/88 (48.9%). There were no statistically significant correlations between maternal ferritin levels and age, surprisingly to note that ferritin levels were not significantly associated with parity, LCB and GA.

Conclusion: We concluded that there was a high burden of third trimester ID among the study population. Maternal age and other assessed risk factors do not have any relationships with third trimester ferritin levels.

Keywords: Iron Deficiency Anaemia, Pregnancy, Ferritin, North-eastern Nigeria

Introduction

Iron is the fourth most common element in the world (1) making up about 5% of the earth’s crust (2,3). Yet, Iron deficiency anaemia (IDA) is the most frequent nutritional deficiency anaemia in the world (1,3) affecting two million individuals worldwide (1). Increased iron demand during menstrual loss, pregnancy and breast feeding contributes to lower iron content in females compared to males (4).

Iron-deficiency anaemia during the first and second trimesters of pregnancy is associated with a twofold increased risk for preterm delivery and a threefold increased risk for delivery of a low-birth-weight infant (5). Frequent pregnancies associated with short intervals are likely to result in maternal depletion in which the successive pregnancy results in worsening iron depletion and birth outcome (4).

Some studies have reported the prevalence of IDA in pregnant women in Nigeria to be as high as 68.7% and 75.6% respectively (6,7). Mothers who are iron deficient are likely to have complications such as infections, ante partum haemorrhage, pregnancy induced hypertension and low birth weight (4,6). IDA leads to increased blood transfusion demand in pregnancy and the puerperium which has been reported to require between 6% and 37% of donated blood in developed and developing countries respectively (8). This makes obstetrics and gynaecological cases responsible for most blood transfusion requests (9,10).

This study was to determine the prevalence and some risk factors for third trimester iron deficiency anaemia among pregnant women in Nguru, Northeast, Nigeria.
**Materials and Methods**

This was a cross-sectional descriptive study in which pregnant women in the third trimester with singleton pregnancy were enrolled consecutively at the antenatal clinic (ANC) of Federal Medical Center (FMC) Nguru, Yobe state Nigeria. The sample size was determined using Windows Programme for Epidemiologists (WinPepi) version 11.65 (11). It was estimated that a minimum sample size of 83 will yield a 95% confidence of detecting the true prevalence with a 10% absolute precision assuming a prevalence of 68.7% (6). Factoring in an anticipated 10% non-response resulted in a sample size of 92.

\[
n = \frac{p \cdot q \cdot Z^2}{d^2}
\]

where 
- \( p \) = the assumed proportion (68.7%) 
- \( q \) = 1 - \( p \) 
- \( z \) = two-tailed normal deviate (1.96 for a 95% confidence level) 
- \( d \) = half the width of the desired confidence interval (10%) 

minimum sample size \( (n) = 83 \)

To adjust for a 10% non-response = \( n \times \frac{1}{1 - (L / 100)} \)

Where \( L = 10 \)

Adjusted sample size = 92.22.

= 92.0

Following acquisition of institutional ethical committee approval (reference number FMCN/GL/SERV/355/vol3/25) and informed consents from the participants, semi-structured questionnaires were utilized to obtain data on age, parity, date of last child birth (LCB), gestational age and intake of iron tablets. Pregnant women with sickle cell anaemia, diabetes, hypertension, chronic cough, tuberculosis, HIV, Hepatitis A and B were excluded.

Complete blood count was determined using the Mindray B-3200 (Shenzen, China) three-part automated haematology analyser and Serum ferritin was analysed using ELIZA kits (Biovendor) which were read at wavelength of 450nm using the Biorad P-3100 micro-plate reader.

Iron deficiency was defined as ferritin levels of <15ng/ml or <40ng/ml in anaemic and non anaemic pregnant women respectively regardless of gestational age (12). Anaemia was defined as a haematocrit ≤30% (13).

Data were analyzed using SPSS version 20.0 (IBM-Chicago). Qualitative variables were summarized as percentages. Continuous variables were summarized using means and standard deviation or median and interquartile range depending on distribution. Spearman's correlation analyses were conducted to determine any relationships. A p value of ≤ 0.05 was considered significant.

**Result**

Eighty-eight (88) pregnant women participated in the study (a non-response rate of 4/92(4.3%)). The mean age, parity and LCB of the study participants were 26.72±6.12 years (95% CI 25.43, 28.03 years) 3.58±3.43 (95% CI 2.85, 4.31) and 1.89±1.85 years (95% CI 1.49, 2.28 years), respectively. Majority of the pregnant women had ferrous sulphate during pregnancy 53(60.2%). Thirty-three (37.5%) of them started taking the ferrous sulphate in the second trimester of pregnancy and the remainder in the third trimester. Thirty-eight (43.2%) were booked during second trimester while 50(56.8%) booked in the 3rd trimester. The mean haematocrit was 32.51± 7.41% (Table 1) while median (IQR) serum ferritin level was 21.0(6.0, 52.7)ng/ml respectively.

**Table 1: Maternal Haematological Variables n=88**

<table>
<thead>
<tr>
<th>Haematological variables</th>
<th>Mean ±2SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin (g/dl)</td>
<td>10.99</td>
</tr>
<tr>
<td>Haematocrit (%)</td>
<td>32.51</td>
</tr>
<tr>
<td>MCV (fl)</td>
<td>84.50</td>
</tr>
<tr>
<td>MCH (pg)</td>
<td>28.09</td>
</tr>
<tr>
<td>MCHC (g/dl)</td>
<td>33.12</td>
</tr>
<tr>
<td>Reticulocyte count (%)</td>
<td>1.88</td>
</tr>
<tr>
<td>RDW</td>
<td>14.554</td>
</tr>
<tr>
<td>Total WBC count (x 10^9/l)</td>
<td>12.47</td>
</tr>
<tr>
<td>Platelets count (x 10^12/l)</td>
<td>295.85</td>
</tr>
</tbody>
</table>

The prevalence of anaemia was 22/88(25.0%, 95% CI 15.9%, 35.1%) with the overall prevalence of ID being 53/88(60.2%, 95% CI 49.5%, 67.5%) out of whom 10/88(11.4%, 95% CI 5.7%, 17.5%) had IDA while ID without anaemia was present in 43/88(48.9%, 95% CI 37.5%, 58.4%). There was a very weak and negative correlation between maternal age and third trimester ferritin levels \( (r = -0.022, p = 0.838) \) other correlation are presented in Table 2.

**Table 2: Correlation of maternal ferritin and Parity, GA, LCB, and ferrous sulphate intake.**

<table>
<thead>
<tr>
<th>Maternal Ferritin</th>
<th>Parity</th>
<th>Gestational Age (GA)</th>
<th>Last Child Birth (LCB)</th>
<th>Intake of ferrous sulphate</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>-0.062</td>
<td>0.006</td>
<td>-0.208</td>
<td>0.069</td>
</tr>
<tr>
<td>p-value</td>
<td>0.568</td>
<td>0.954</td>
<td>0.520</td>
<td>0.523</td>
</tr>
</tbody>
</table>

**Discussion**

The stages of IDA include iron depletion, iron deficient erythropoiesis and iron deficiency anaemia which is the most advanced stage. The 25.0% prevalence of maternal anaemia in this study is lower than the findings of Adanikin et al (14) in Ekiti as well as a
The weak and negative correlation between parity and maternal ferritin in this study suggests that parity on its own may not indicate ID. Hence high parity may require the concomitant presence of other factors before ID results. Nevertheless, those with high parity should start iron therapy to replenish their stores before becoming pregnant and continue during pregnancy to prevent iron depletion. Early and sustained iron supplementation in pregnancy will likely improve pregnancy outcomes like preventing premature delivery, assuring adequate maternal and foetal iron stores, together with bigger and healthier babies while assuring maternal survival. This study suggests that maternal ferritin levels are higher in those mothers with shorter child spacing than those that have longer child spacing. While this correlation is weak, it is also important to note that this is most likely a spurious correlation. Our finding may be due to the inherent limitations of a cross-sectional design and the sampling technique utilized in this study which enrolled participants as they presented to the antenatal clinic. Child spacing of 2-3 years between pregnancies should be encouraged for mothers so that they can replenish the iron stores (21). The positive but weak relationship demonstrated in the study between ferrous sulphate intake and ferritin levels should be interpreted with caution. This is because this study neither assessed the degree of compliance with intake nor evaluated concomitant factors that may inhibit iron absorption. However, it has been demonstrated that intake of iron supplements may increase the maternal ferritin (22). However, serum ferritin accurately reflects only iron store but not the recently ingested iron (23).

**Conclusion**

There is a high burden of third trimester iron deficiency among women in FMC Nguru Yobe State, Nigeria. Maternal age, parity, duration since last child birth and gestational age appear not have any relationships with third trimester ferritin levels.

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**References**

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