Prevalence of anaemia in pregnancy in a regional health facility in South Africa

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Background. Anaemia is a major global health problem affecting an estimated 42% of pregnant women worldwide. There is a paucity of South African (SA) data on anaemia in pregnancy, despite the fact that parasitic infections are endemic and the nutritional status of sections of the population is poor.

Objective. To determine the prevalence of anaemia among antenatal attendees in a regional hospital in Durban, SA.

Methods. This was a cross-sectional prospective study in a regional health facility in an urban setting serving a population of low socioeconomic status. Venous blood samples to perform a full blood count were obtained from antenatal attendees at their first clinic visit.

Results. Two thousand pregnant women were studied; the mean (standard deviation) age and gestational age at booking was 27.6 (7.6) years and 21.7 (7.1) weeks, respectively. Eight hundred and fifty-four (42.7%) were anaemic (haemoglobin (Hb) levels <11 g/dL). The majority (81.4%) were mildly anaemic. There were five (0.6%) cases of severe anaemia (Hb <7 g/dL). The prevalence of anaemia was significantly higher in HIV-positive compared with HIV-negative pregnant women (71.3% v. 28.7%; p<0.0001). The common morphology was normochromic normocytic (n=588, 69.9%). Anaemia was a common problem among antenatal attendees in an SA urban population.

Conclusion. The prevalence of anaemia was 42.7%. In the majority (81.4%) the anaemia was mild and normocytic and normochromic (68.9%). Anaemia is a common problem among antenatal attendees in an SA urban population.


Anaemia is a common condition globally and is associated with adverse events in pregnancy.1-3 The World Health Organization (WHO) estimates that about 56% of pregnant women in low- and middle-income countries (LMICs) and 23% in high-income countries are anaemic. Most cases of anaemia in women are due to iron deficiency. Anaemia is associated with substantial health and economic cost implications in LMICs.1-3

Iron deficiency in pregnancy is probably due to the fact that iron stores are inadequate and insufficient to meet the increased requirements in pregnancy. Iron-deficiency anaemia has been associated with an increased risk of stillbirths, low-birth-weight babies, intrauterine growth restriction, neonatal sepsis and maternal mortality.4-6

The Saving Mothers Report (2010 - 2013)7-10 found that 40% of maternal deaths in South Africa (SA) were associated with anaemia, despite the fact that micronutrients (prophylactic iron, folic acid and multivitamins) are provided routinely throughout pregnancy. It is plausible that the anaemia associated with maternal mortality may be due to poor adherence in taking prophylactic micronutrients and to the poor overall nutritional status of the population.

There is a paucity of data on anaemia among SA pregnant women, among whom there is high prevalence of HIV infection. HIV is associated with a high prevalence of anaemia in sub-Saharan Africa.11 A study in SA by Van Bogaert11 found a prevalence of anaemia of 19.7% in a rural population. Prevalences reported from African countries indicate varying rates,8-10 probably reflecting differing sizes of study populations, geographical area (rural or urban), rates of parasitic infestation and levels of education.

Objective

To determine the prevalence of anaemia at the first antenatal visit in a cohort of black SA women attending a regional hospital in an urban setting.

Methods

Ethical clearance and regulatory permission was obtained from the University of KwaZulu-Natal Biomedical Research Ethic Committee (BE 306/12) and from the Regional Hospital Administration. A cross-sectional prospective study over a 2-year period (2012 - 2014) was performed in a regional hospital in Durban, SA, serving a population with largely low socioeconomic status. Written informed consent was obtained from consecutive women registering for antenatal care and the relevant demographic and clinical data were collected in a structured format. The standard practice at the study site was to perform a full blood count at the first antenatal visit and to repeat the investigation at between 34 and 36 weeks’ gestational age. All women regarded as low risk attended for prenatal care on four occasions at least during the pregnancy, while women who had ‘risk’ features were seen more frequently.

Anaemia was defined as a haemoglobin (Hb) concentration of <11 g/dL (WHO definition).12 All women received prophylactic iron therapy (oral ferrous sulphate 200 mg) and folic acid 5 mg daily. If anaemia was present, therapeutic doses of iron (oral ferrous sulphate 200 mg 3 times a day) and folate 5 mg daily were prescribed with instruction on appropriate nutritional intake. This management was standard clinical practice at the study site.

The Hb levels were arbitrarily divided into the following groups: (i) >11 g/dL; (ii) 10 - 10.9 g/dL (mild anaemia); (iii) 7 - 9.9 g/dL (moderate anaemia); and (iv) ≤7 g/dL (severe anaemia). Gestational
age was calculated taking into account the last menstrual period, an ultrasound dating scan and the symphysis-fundal height measurement.

Statistical analysis
Data were entered into a computer database using Microsoft Excel software and imported on SPSS (version 22) for analysis. A p-value of <0.05 was considered statistically significant.

Results
Fig. 1 shows the prevalence, grades and types of anaemia. Eight hundred and fifty-four (42.7%) were anaemic. The majority (81.4%) were mildly anaemic, whereas 18.0% were moderately anaemic. There were five (0.6%) cases of severe anaemia (Hb ≤7.0 g/dL). The prevalence of anaemia at booking was significantly higher in HIV-positive than in HIV-negative pregnant women (609 (71.3%) v. 245 (28.7%); p<0.0001).

Table 1 shows the relevant clinical data; most women were young (mean (standard deviation (SD)) age 27.6 (7.6) years) and of low parity. The mean gestational age at the booking visit was 24 weeks.

Table 2 shows the demographic and obstetric data of the anaemic antenatal attendees. The data include HIV status of all participants. Six hundred and nine of the 845 with anaemia were HIV-infected.

Table 3 shows the clinical characteristics and severity of anaemia; 124 (14.5%) anaemic patients were <19 years of age and 111 (13.0%) were aged >35 years. Six hundred and one primigravidas and 302 grand multiparas were included in the study. Anaemia was recorded in 197 primiparas and 111 grand multiparas, giving a prevalence of 32.7% and 36.8%, respectively.

Discussion
The prevalence of anaemia in pregnancy at the first antenatal visit in our study cohort of 2 000 pregnant women was 42.7%, a result that is consistent with prevalence rates of 40.0% in Kenya,[8] 38.2% in Ethiopia[9] and 47.4% in Tanzania.[10] Our sample size was large and confirms that anaemia is a common health problem in an SA setting. There are several factors responsible for the high prevalence of anaemia in LMICs such as SA: socioeconomic deprivation, malnutrition, high incidences of malaria and HIV infection, hookworm infestation, high numbers of grand multiparas, late booking, and inadequate child spacing because of lack of family planning.

Recently there have been reports of differences in Hb levels based on racial groups. One of these studies found that mean Hb levels were lower in non-Caucasian than Caucasian pregnant populations from 27 gestational weeks until term.[11] Furthermore, lower Hb levels have been described for population groups such as African Americans (−1 g/dL), Vietnamese (−1 g/dL) and women in Greenland (−1 g/dL).[12] Our patients were black South Africans of low socioeconomic status. Variations in Hb concentrations obviously require the establishment of reference levels.
for pregnant populations in SA. This may be logistically difficult, however, given the diversity of the population and the geographical nature of SA, with a sizeable population living at high altitudes. It has been reported that factors such as altitude of residence, genetics living at high altitudes. It has been reported that
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The prevalence of anaemia at the first
antenatal visit is high and a major health
issue at the study site in Durban. There is
a need to strengthen our healthcare system
to ensure a definitive diagnosis so that
appropriate counselling and treatment can
be provided in early pregnancy.

Table 2. Demographic and obstetric data of women with anaemia v. HIV status

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (N=854)</th>
<th>HIV +ve (N=609)</th>
<th>HIV –ve (N=245)</th>
<th>p-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean (range)</td>
<td>27.6 (14 - 45)</td>
<td>26.5 (14 - 40)</td>
<td>27.4 (18 - 45)</td>
<td>0.3</td>
<td>-0.0566 - 0.0746</td>
</tr>
<tr>
<td>Parity, median (range)</td>
<td>2 (1 - 6)</td>
<td>1 (1 - 2)</td>
<td>2 (1 - 6)</td>
<td>0.2</td>
<td>-0.0067 - 0.0267</td>
</tr>
<tr>
<td>Gestation at booking (weeks), median (range)</td>
<td>22 (17 - 34)</td>
<td>22 (18 - 34)</td>
<td>22 (18 - 34)</td>
<td>1</td>
<td>-0.0614 - 0.0614</td>
</tr>
</tbody>
</table>

Table 3. Clinical data and severity of anaemia

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total (N=854)</th>
<th>Mild anaemia (Hb 10 - 10.9 g/dL) (N=695)</th>
<th>Moderate anaemia (Hb 7 - 9.9 g/dL) (N=154)</th>
<th>Severe anaemia (Hb &lt;7 g/dL) (N=5)</th>
<th>p-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age groups, n (%)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>≤19</td>
<td>124 (14.5)</td>
<td>90 (12.9)</td>
<td>34 (22.1)</td>
<td>0 (0.0)</td>
<td>0.003</td>
<td>0.0304 - 0.1536</td>
</tr>
<tr>
<td>20 - 24</td>
<td>133 (15.6)</td>
<td>107 (15.4)</td>
<td>26 (16.9)</td>
<td>0 (0.0)</td>
<td>0.6</td>
<td>-0.0485 - 0.0785</td>
</tr>
<tr>
<td>25 - 30</td>
<td>295 (34.5)</td>
<td>259 (37.3)</td>
<td>36 (23.4)</td>
<td>0 (0.0)</td>
<td>0.001</td>
<td>0.0559 - 0.221</td>
</tr>
<tr>
<td>31 - 34</td>
<td>191 (22.4)</td>
<td>153 (22.0)</td>
<td>37 (24.0)</td>
<td>1 (20.0)</td>
<td>0.5</td>
<td>-0.0527 - 0.0927</td>
</tr>
<tr>
<td>≥35</td>
<td>111 (13.0)</td>
<td>86 (12.4)</td>
<td>21 (13.6)</td>
<td>4 (80.0)</td>
<td>0.6</td>
<td>-0.046 - 0.07</td>
</tr>
<tr>
<td>Parity, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 4</td>
<td>197 (23.1)</td>
<td>153 (22.0)</td>
<td>44 (28.6)</td>
<td>0 (0.0)</td>
<td>0.07</td>
<td>-0.0077 - 0.1397</td>
</tr>
<tr>
<td>≥5</td>
<td>546 (63.9)</td>
<td>496 (71.4)</td>
<td>49 (31.8)</td>
<td>1 (20.0)</td>
<td>0.001</td>
<td>0.3123 - 0.4797</td>
</tr>
<tr>
<td>HIV status, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>245 (28.7)</td>
<td>189 (27.2)</td>
<td>54 (35.1)</td>
<td>2 (40)</td>
<td>0.5</td>
<td>-0.0519 - 0.0431</td>
</tr>
<tr>
<td>Positive</td>
<td>609 (71.3)</td>
<td>506 (72.8)</td>
<td>100 (64.9)</td>
<td>3 (60)</td>
<td>0.6</td>
<td>-0.0451 - 0.0532</td>
</tr>
</tbody>
</table>

For pregnant populations in SA. This may
be logistically difficult, however, given the
diversity of the population and the geographical
nature of SA, with a sizeable population
living at high altitudes. It has been reported that
factors such as altitude of residence, genetics
and nutrition have an impact on Hb levels.[8-10]
While smoking behaviour also influences Hb
concentrations, our study population is known
to have low smoking rates (3.0% − unpublished
departmental statistics).

In our study, the mean gestational age was
21 weeks. It is known that fluctuations in Hb
levels occur by trimester as a result of mater-
nal and fetal physiological demands. It is
therefore suggested that a 1.0 g/dL decrease
takes place between the first and third tri-
mester of pregnancy, with Hb concentra-
tions decreasing by a further 0.5 g/dL in the
second trimester.[11] Although we defined anae-
mia according to WHO recommendations for
practical reasons in our setting, we did not
take into account trimester-adjusted Hb cut-off
levels. As shown in Table 3, 34.7% had Hb
levels of between 10 g/dL and 10.9 g/dL, while
8.0% had an Hb level <10 g/dL.

Hb concentrations have also been reported
to be affected by age. Jamaican girls between
the ages of 13 and 14 years have low Hb levels
(−1.0 g/dL from normal).[13] In our study, 124
women who were aged <19 years had mild
or moderate anaemia. Age-related anaemia
in pregnancy in our setting needs further
investigation.

HIV infection has been reported to be
associated with anaemia, either independently
or due to antiretroviral medications such as
zidovudine. A recent report by Nandial
states that anaemia is a common
finding in HIV-infected pregnant women. In
our study, a high prevalence of anaemia
(71.3%) was observed in HIV-infected
patients. 2.5 times higher than in those
who were uninfected (Table 3). We did not
investigate the prevalence of anaemia in the
HIV-infected women.

Anaemia is reported to be strongly asso-
ciated with maternal mortality,[12,13] with
severe anaemia also increasing the risk
of perinatal mortality.[14] This association
obviously needs more detailed investigation
because anaemia in LMICs is underpinned
by malaria, parasitic infections such as
bilharzia, and poor nutrition.

Our study demonstrates that the common
morphology of anaemia among pregnant
women was normochromic normocytic (in
68.9%), 1.4% having hypochromic microcytic
anaemia. Although we did not do iron studies
to establish iron status, it has been reported
that only 50% of cases of anaemia in pregnant
women are responsive to oral iron.[15]
There is a view that a universal approach
of prophylactic iron therapy may neglect
untreated diseases and universal therapeutic
iron therapy may be inappropriate.[19]

It should be noted that our study was
conducted in a regional hospital and that
the majority of pregnant women were urban
residents. The prevalence of anaemia in
the population as a whole could well have
been underestimated. A large community-
based study needs to be done to determine
the prevalence of anaemia in the general
population.

Conclusion
The prevalence of anaemia at the first
antenatal visit is high and a major health
issue at the study site in Durban. There is
a need to strengthen our healthcare system
to ensure a definitive diagnosis so that
appropriate counselling and treatment can
be provided in early pregnancy.
References


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