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, 68.9%). 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.

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 less than 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,\(^5\) 38.2% in Ethiopia\(^6\) and 47.4% in Tanzania.\(^7\) 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.\(^8\) 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).\(^9\) 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 cal nature of SA, with a sizeable population diversity of the population and the geographical logistically difficult, however, given the population in SA. This may take into account trimester-adjusted Hb cut-offs. As shown in Table 3, 34.7% had 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 22 weeks. It is known that fluctuations in Hb levels occur by trimester as a result of maternal and fetal physiological demands. It is therefore suggested that a 1.0 g/dL decrease takes place between the first and third trimester of pregnancy, with Hb concentrations decreasing by a further 0.5 g/dL in the second trimester.[31] Although we defined anaemia 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).[31] 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.

Anaemia is reported to be strongly associated with maternal mortality,[25] with severe anaemia also increasing the risk of perinatal mortality.[4] 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.[14]

There is a view that a universal approach of prophylactic iron therapy may neglect untreated diseases and universal therapeutic iron therapy may be inappropriate.[14]

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.

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>
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</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</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>1 - 4</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>≥5</td>
<td>111 (13.0)</td>
<td>46 (6.6)</td>
<td>61 (39.6)</td>
<td>4 (80.0)</td>
<td>0.001</td>
<td>0.2721 - 0.3879</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>
References


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