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Prevalence of Anaemia in Pregnancy at Greytown, South Africa.

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Abstract

Context: Anaemia in pregnancy is a leading cause of maternal and perinatal morbidity and mortality mainly in developing countries. It is a preventable medical condition through public health interventions which are potentially feasible and cost-effective. In order to strengthen planning and management, the prevalence of anemia in pregnancy at a district hospital was ascertained.

Objectives: To describe antenatal booking visits, haemoglobin levels and to estimate the prevalence of Anaemia in pregnancy based on the criteria set by South Africa (National) and World Health organization and to identify the risk factors.

Study-design, setting and subjects: A retrospective cross-sectional descriptive study was conducted using antenatal clinic register of a rural district (Greytown) Hospital of KwaZulu-Natal Province during January to December 2003. A total of 711 pregnant women from 1486 booking visits were recruited.

Main outcome measures: Percentage of attendees had low hemoglobin, effects on haemoglobin concentration of age and0 gestational age (trimester).

Results: Based on the South African (Haemoglobin <10gm/dL) and WHO (Haemoglobin <11 gm/dL) criteria of Anaemia, 15.7% and 39.9% attendees respectively were anaemic. Booking visits for the pregnancies were 14.2% during first, 70.7% during second and 15.1% during third trimesters respectively.

Conclusion: The prevalence of Anaemia in pregnancy is high and evidence of late booking for antenatal care in Greytown comparable with other findings in Africa. There is an urgent need for Health Education and promotion of this population for early bookings for antenatal care and management of anemia.

Key Words: Anaemia, Haematocrit, Pregnancy

Introduction

Anaemia in pregnancy continues to be a major public health problem in the world. More than 600 000 women between the age of 15 44 years die each year worldwide as a result of complications arising from pregnancy and childbirth. The proportion of maternal deaths due to anaemia has been estimated for the following countries: India (16%), Kenya (11%), Nigeria (9%) and Malawi (8%)[1]. A higher rate (20%) of all maternal deaths in Sub-Saharan countries is related to anaemia in pregnancy[2, 3]. It is estimated that anaemia affects nearly two thirds of all pregnancies and about half of non-pregnant women in developing countries[4]. In Africa, the prevalence of anaemia is estimated to be between 35% and 75%[5]. Anaemia in pregnancy, especially severe Anaemia, is associated with an increased risk of maternal and perinatal mortality[6-8].

In a review of epidemiological criteria for assessment of severity and magnitude of anaemia in pregnancy, the following categories were proposed; mild anaemia (Haemoglobin (Hb.) 9.0-10.9gm / dL) and severe anaemia (Hb. < 7. o gm /dl)[9]. This is in accordance with WHO definition of anaemia in pregnancy[8].

Provision of antenatal care is regarded as a cornerstone of maternal and perinatal health care. The aim of such care is to identify maternal and fetal problems during antenatal period and manage effectively to ensure healthy mother and baby. In spite of efforts taken nationally (developing policies, allocating resources, setting norms and standards etc.) and locally at health institutional level (utilization of resources, implementation of policies and protocols) for effective health care delivery, there is still a high rate of maternal and perinatal morbidity and mortality for Kwazulu-Natal Province (Maternal Mortality Rate of 144/100,000 live births for the triennium 1999-2001 and Peri-Natal Mortality Rate of 43 / 1000birth) and South Africa (MMR between 175-200/100000 live births for the triennium 1999-2001 and PNMR of 38.6/1000 births for the city and town groups hospitals) noted[10, 11].

However, the actual prevalence rates of pregnancy conditions for many individual countries and communities are unknown. At the African Regional Consultation on the Control of Anemia in Pregnancy (1989), it is recommended that Simple studies of prevalence and etiology should be undertaken.

In this paper we examined the distribution of Hb. values obtained by screening women at their antenatal booking visit at Greytown district hospital. The percentage of women with mild anaemia (Hb < 10 gm/dl) and severe anaemia (Hb. < 7.0 gm/dl) were determined and compared with the prevalence of anemia according to the WHO definition (Hb. <11 gm/dL)[12].

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Table 1:
Age Distribution of Study Subjects

Age	Percentage
Teenage (<18 years)	15.8
18-23 years	32.9
24-28 years	23.7
29-33 years	17.1
34-39 years	7.8
40-44 years	2.1
>45 years	0.7

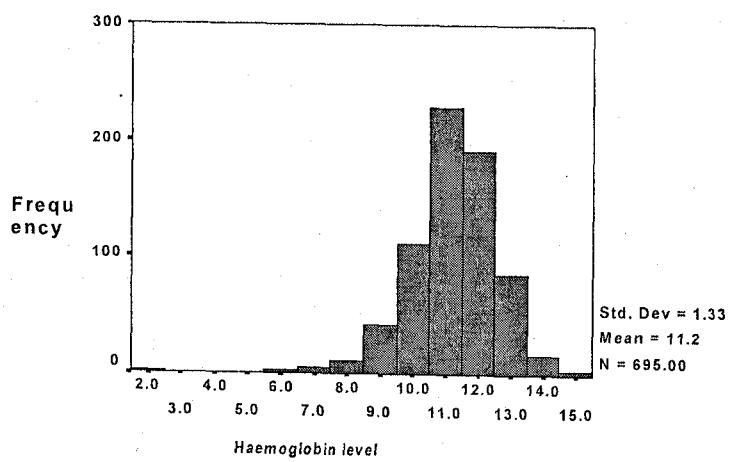
Table 2:
Distribution of Gestational Age at the Booking Visit

Gestational Age	Percentage
First trimester	14.2
13-16 weeks	17.1
17-20 weeks	24.3
21-24 weeks	23.7
25-28 weeks	15.6
>29 weeks	5.1

Table 3:
Univariate and Multivariate Logistic Regression of Risk Factors for Anaemia (Hb < 10 g/dL and Hb < 11 g/dL) and Severe Anaemia (Hb. < 7 g/dL).

Anaemia (Hb < 10 g/dL)	n	N(total)	OR (95% CI)
Trimester			
1	12	97	1
2	84	484	1.486 (0.777 2.842)
3	103	23	2.023 (0.944 4.339)
Anaemia (Hb < 11 g/dL)			
Age (years)			
< 20	56	114	1
= 20	237	597	0.636 (0.422 0.961)
Trimester			
1	25	97	1
2	211	484	2.254 (1.379 3.683)
3	47	103	2.522 (1.382 4.601)
Severe Anaemia (Hb < 7g/dL)			
Age (years)			
< 20	3	114	1
= 20	17	597	0.926 (0.262 3.271)
Trimester			
1	1	97	1
2	11	484	2.235 (0.285 17.511)
3	7	103	7.041 (0.848 58.482)

Figure 1:
Distribution of Haemoglobin Values



Materials and Methods

Study Design
A retrospective cross-sectional descriptive study was conducted at the Antenatal care (ANC) Clinic of Greytown Hospital for the period January to December 2003.

Sites and Samples
Women who attended ANC clinic of Greytown hospital were studied. Greytown hospital is situated about 80 kilometers north-east of Pietermaritzburg, the capital city of KwaZulu-Natal province. It is a District Level hospital, which serves as a primary level facility for the populations of about 70,000 people who are mainly rural (>95%), black (>96%) and poor. Most of the residents of this area are reliant on this public health facility as there is no Private hospital except the existence of few General Practitioners. The ANC clinic is held once a week, for those attending for their booking visits. Based on the ANC clinic register a total of 1486 booking visits and 4585 repeat visits were recorded from January to December 2003. All 711 consecutive booking visits during July to December 2003 were recruited for this study.

Screening Procedure
Relevant history and examinations of the pregnant women are conducted at the first visit of every pregnant woman. Screening for anaemia, syphilis and Rhesus factor are performed using venous blood samples as a routine procedure. A Full Blood Count carries out on one of each woman's blood samples to estimate Hemoglobin (Hb.) level at the Hospital laboratory. A day later, the reports of the blood tests are then sent to the ANC clinic for recording on the clinic register.
The ages and parity are obtained from mothers and recorded on the antenatal carrying cards. The gestational age is estimated by examination of the fundal height or from the women's last recorded menstrual period. A dedicated Professional nurse at the clinic recorded the mothers' age, gestational age, Hb. level, Rhesus status and syphilis results in the clinic register. The original copy of the Laboratory results are attached to the patients ANC carrying cards at the second visit. The clinic register was used for this study thus parity of the mother was omitted.

Statistical Analysis
Data was entered into and analyzed using SPSS11.5 for windows. Frequency tables, Chi square test and Regression analysis was performed. In an attempt to identify a risk group, univariate and multivariate logistic regressions were performed. This procedure was undertaken in order to determine the Odds Ratio (OR) of the age, trimester, and overall and severe anaemia.

Prior Permission was obtained from the Hospital Management for utilizing the ANC register to conduct the study.

Results

Information at booking on a total of 711 consecutive attendees were analyzed. Sixteen of which had no Hb. results, 27 had missing Gestational ages and 2 had missing ages of the mothers.

Age of pregnant mothers
Most of the pregnant mothers (90%) were below the age of 34 years. Nearly half (49%) were below the age 24 years and teenagers (age <18 years) were 15.8% (Table 1).

Gestational age at booking visit
While only 14.2% attendees were at the first trimester, the majority (>70%) booked during the second trimester (Table2).

Prevalence of Anaemia
The distribution of haemoglobin values obtained is presented in figure 1. The range of values was 2.3 to 15g/dL with a mean of 11.2 g/dL and a median (25^{th}, 75^{th} centiles) of 11.2 g/dL (10.5, 12). The prevalence of all anaemia based on national criteria (Hb <10 g/dL) was 15.7% ($p<0.05$ and 95% CI, 13.0% -18.4%) and the prevalence of severe anaemia (Hb < 7 g/dL) was 0.6% ($p>0.05$).
The prevalence of anaemia based on the WHO definition of anaemia in pregnancy (Hb <11 g/dL) was 39.9% ($p<0.05$ and 95% CI, 36.3%-43.5%) with the same prevalence of severe anaemia (0.6%). The difference in prevalence for overall anaemia based on National and WHO definition was significant ($p<0.05$).
Multiple linear regression was carried out to determine the effect of age and trimester on haemoglobin level. Age and gestational age were identified to be statistically significant determinants of low Hb. levels ($p<0.05$).
Univariate and multivariate analysis was then performed to identify the risk factors for overall anaemia (using SA national and WHO criteria) and severe anaemia (Table 3).

Effect of Age
Age was recorded for 709 women. Univariate analysis indicated an increased risk for adolescents (age < 20 years) based on Hb. level < 11gm/dL (WHO criteria). However, according to the criteria set out by the National Dept. of Health (Hb.<10gm/dL), there was no risk for anaemia and severe anaemia. However, when age was adjusted for gestational age it was found to be significant as well.

Effect of Gestational Age at Booking:
The majority (94.9%) of women booked in the first and second trimester. Therefore, trimester at the bookings was found to be a risk factor for overall anaemia (WHO criteria of Hb.<11 gm/dL) but not a risk factor for anaemia based on National criteria (Hb. <10 gm/dL) and severe anaemia (Hb.<7gm/dL).

Discussion
According to the WHO definition of Anaemia in pregnancy (Hb. <11gm/dL), the prevalence of anaemia in Greytown is high (39.9%) and comparable with findings from other studies conducted in other Sub-Saharan countries.
This study is limited to those women who attended antenatal clinic in one district hospital. In KwaZulu-Natal, it is estimated that over 95% of women attend on at least one occasion to antenatal care facilities[13, 14]. As there is no reason to believe that women who are anaemic selectively visited the antenatal clinic, it may be assumed that the estimate of prevalence obtained in this study is a reasonable estimate for the catchment population.
The definition for overall anaemia in pregnancy is Hb. < 10 gm/dL (SA, National) and <11 gm/dL (WHO), and severe anemia of Hb. < 7 gm/dL (both national and WHO) are chosen arbitrarily. However, it is currently not known to what degree anemia is definitely associated with negative maternal and or foetal outcome[15]. Recently it has been suggested that in areas of high prevalence, cut off points for the diagnosis of anaemia should be lowered[16, 17]. Thus the overall anaemia in pregnancy using Hb. level 10gm/dL in South Africa is considered appropriate.
The prevalence of overall anaemia in pregnancy based on SA National (15.7%) is low compared to WHO criteria (39.9%) in this rural area. In Mozambique the prevalence of overall anaemia (using WHO criteria) is found 58% and severe anaemia 1%[18]. A study from rural Zaire has reported a prevalence of 76% for overall anaemia (Hb. <11 gm/dL) and 3.7% for severe anaemia (Hb. <7 gm/dL)[19]. In rural Tanzania it is reported that the prevalence of overall anaemia (Hb < 11 gm /dL) 71.7% and severe anaemia of 4%[20].
The prevalence of anaemia is estimated 41.5% from the neighboring country Namibia using the same type of cross section study and similar criteria (Hb. <11 gm)[21]. However, it is clear that anemia in pregnancy is still a very common (39.9%) problem in this community.
In South Africa, free maternal and child health care are provided at public health facilities. Pregnant women are encouraged to book for antenatal care as soon as pregnancy is detected, even as early as 4 or 5 weeks of gestation. Inspite of all these provisions, early bookings in our population was found lower, only 14.2% in first trimester and between 13 16 weeks was 17.1%. Most of them booked during second trimester (70.6%). This finding is similar to a study conducted in rural Tanzania (87.6% booked in first or second trimester)[17].
At the first visit, history taking and examination by the health care workers are conducted to identify the risk status of the pregnancy and according to the WHO recommended Guidelines on prevention of anaemia, supplementation of iron and folic acid are given to all pregnant mothers . Based on the risk scores, interventions and follow-up return visits are planned. Pregnant women of low risk should receive at least 5 antenatal visits during her pregnancy[12].
In a review on maternal health during adolescent (<20 years) pregnancy it was suggested that they are at risk for anemia[22, 23]. However, the sample size was very small in this study. In addition the influence of age has often not been separated from the effect of parity. Since the absence of parity in this study is limited to identify parity as a risk factor in our population. Most studies in Africa had confirmed the findings of this study, that age alone is not a significant determinant of Haemoglobin values[17, 18].
Women who booked during second and third trimester of pregnancy had a significantly increased risk for overall anaemia based on WHO criteria (Hb.<11gm/dL). This finding is similar (18% in first, 26% in second and 29% in third trimester) to a cross sectional study conducted in a semi-urban black population of Durban (Umlazi) in KwaZulu-Natal[24]. It is also established from the same study that there was a progressive drop in serum iron levels, trasferrin saturation and serum ferritin levels for Indian population but the mean values were within normal range for black population. Although the data was cross sectional, this findings were in accordance with the expected decline in Hb. levels due to plasma volume expansion in the course of normal pregnancy. In addition, it may be expected that foetal demand, underlying maternal diseases and untreated anemia in early pregnancy is likely to worsen.

Recent research has shown that the provision of iron and folic acid are insufficient to combat nutritional anemia[25]. Other nutritional deficiencies including vitamin A and vitamin B12, infection (HIV, parasitic) and parity, which may have varied impact in the Hb. status as well as fetal and perinatal adverse outcomes, require further study. The effect of malaria in causing anaemia in pregnancy in other African countries had been documented and thus it is likely to vary from region to region[20, 23]. Malaria is not known as endemic in this part of the population thus unlikely affected our findings.
In conclusion, the prevalence of anaemia in pregnancy in Greytown is high. The prevalence of Anaemia varies greatly using WHO definition. The effect of Hb. level

between 10-10.9gm/dL needs to be assessed on the outcome of pregnancy in South African context. The causes of late bookings for antenatal health care also need investigation as antenatal care is free in SA at public health facilities and regarded as the cornerstone to improve the maternal and foetal outcome of pregnancy and childbirth. There is an urgent need for Health Education and promotion for this population for early booking for antenatal care and management of pregnancy related conditions.

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