Maternal haematocrit and pregnancy outcome in Nigerian women

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Summary

Anaemia is the most common medical disorder in pregnancy[4] and a direct or indirect cause of maternal and perinatal mortality; therefore antenatal care should be concerned with early detection and management.

The incidence of anaemia in 735 normal singleton pregnant patients at booking in the University College Hospital, UCH, Ibadan, between the 1st of June 2000 and 31 of May 2001 was 15%.

Six hundred and thirty-three of the patients (86.1%) presented for delivery at this centre. Five hundred and sixty seven (89.6%) of the patients were not anaemic when seen in labour, reducing the incidence of anaemia to 10.4%. Forty-two (6.6%) and 24 (3.8%) patients had mild and moderate anaemia respectively. No patient had severe anaemia.

Of those presenting in labour, 195 (30.8%) were primigravid, while 417 (65.9%) and 21 (3.3%) were multiparous and grandmultiparous respectively. Five hundred and twenty-eight (83.4%) were aged between 21 and 35 years. The mean gestational age at booking was 21.3 weeks and at delivery was 38.7 weeks.

Spontaneous vertex delivery was achieved in 76.3% with 96.7% having live births. The perinatal mortality rate was 33 per 1,000 births. Stillbirths occurred more in the moderately anaemic patients. The higher the packed cell volume in labour, the greater the birth weight, better the Apgar scores but the more the blood loss at delivery.

The babies of the patients with a normal packed cell volume had better Apgar scores at one minute, which was statistically significant (p value < 0.05), but the mildly anaemic patients had babies with better Apgar scores at 5 minutes. This was however not statistically significant.

There was no maternal death.

Keywords: ***Packed cell volume, Anaemia, Labour, Pregnancy, Ibadan, Nigeria.***

Résumé

L'anémie est un médical le plus fréquent pendant la grossesse et une cause directe ou indirecte de la mortalité et périnatale, donc, des soins anténataux doivent s'occuper de la détection, et la prise en charge précoce.

L'incidence d'anémie chez 735 femmes enceintes avec singletons normaux qui se sont inscrit au College Hospitalo-Universitaire UCH, Ibadan entre le 1er juin 2000 et le 31 mai 2001 était 15%. Six cents trente trois des patientes soit 86,1% se sont présentées pour accouchement dans ce centre. Cinq cents soixante sept soit 89,6% des patientes étaient sans l'anémie comme on l'avait noté pendant l'accouchement ce qui a diminué l'incidence d'anémic à 10,4%. Quarante-deux soit 6.6% et vingt quatre soit 3,8% des patientes atteintes d'anemie bénigne et modérée respectivement. Aucune des patientes était attteinte d'anémie grave.

Parmi ceux qui se sont inscrit dans la salle d'accouchement, 195 soit 30,8% étaient Primigravid, tandis que 417 soit 65,9% et 21 soit 3,3% étaient multiparous et grandmultiparous respectivement. Cinq cents vingt huit soit 83,4% étaient agés entre 21 et 35 ans. L'age moyen gestationel pendant l'inscription était 21,3 semaines et 38,7 semaines au cours d'accouchement.

Accouchement vertex spontané était réalisé dans 76,3% avec 96.7% recensés comme enfants ne vivant. Le taux de la mortalité périnatale était 33 par 1000 naissances. Les cas des enfants mortné se sont produit chez des patientes atteintes d'anémie modérée. Plus élevé que soit le volume de panier-cellule pendant l'accouchement, plus le niveau du poids de naissance, et le mieux les Scores Apgar mairs plus la perte du sang pendant l'accouchement.

Les bebés de s patientes atteintes de volume du panier-cellule avaient des meilleures Scores Apgar pendant une minute, ce qui était statisquement important (P valeur <0,05), mais les patientes atteintes d'anémie bénigne avaient des bébés avec des meilleurs Scores Apgar pendant 5 minutes. Cependant, ceci n'était pas statisquement important. Il n' y avait aucune mort maternelle.

Introduction

The World Health Organisation (WHO) defines anaemia in pregnancy as haemoglobin levels less than 11.0g/dL[1]. In practice, for more than three decades many of our hospitals use a lower level of 10g/dL or less as indicating anaemia[2]. This level has been justified on the basis of the work of Lawson (1967), which showed that serious harm to the fetus did not occur until the haemoglobin value was below 10g/dL or a packed cell volume (P.C.V.) of 30%[3].

Anaemia is the most common medical disorder in pregnancy[4]. It is a direct or indirect cause of maternal and perinatal mortality and antenatal care should be concerned with early detection and management of all degrees of anaemia in pregnancy and it deserves more attention than it is currently receiving[5,6]. It still remains a problem not only in the developing but also in the developed countries[6].

Each year more than 500,000 women die from pregnancy related causes, the vast majority (99%) occurring in developing countries[5]. Estimates of maternal mortality from anaemia range from 34 per 100,000 live births in Nigeria to as high as 194 per 100,000 in Pakistan[5]. In combination with obstetric haemorrhage, anaemia is estimated to be responsible for 17% to 46% of causes of maternal deaths[5].

The objective of this study was to estimate the prevalence of anaemia in preegnancy and to find out the effects of maternal haematocrit on delivery outcome.

Materials and methods

This study was performed at the University College Hospital, U.C.H, Ibadan, Nigeria, which is a specialist hospital with a yearly delivery rate of about 1,500.

All pregnant women who present for antenatal care are

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booked. Patients are generally encouraged to book as soon as they mis their menstrual period of confirm that they are pregnant. At booking, blood samples are taken for packed cell volume (P.C.V) in addition to other routine antenatal tests. Blood for P.C.V. is taken by finger prick into a capillary tube and centrifuged with the result read on a haematocrit reader. A repeat is done at every antenatal visit untill delivery and any cause of anaemia is investigated and treated. The last P.C.V. was taken on presentation in labour.

The use of capillary tubes is very convenient for routine determination of the P.C.V7. Patients, who were recently transfused, have haemoglobinopathies, early pregnancy bleeding, multiple pregnancies or antepartum haemorrhages were excluded from the study.

Information was collected on the maternal age, parity, gestational age at booking and delivery as well as the P.C.V. at booking and in labour. Others were the mode of delivery, fetal outcome, birth weight, Apgar scores at 1 and 5 minutes and blood loss at delivery.

Anaemia in pregnancy is classified into three categories for treatment and to predict outcome[1,8]. These are:-

- Mild anaemia; P.C.V. = 27 – 29%
- Moderate anaemia; P.C.V. = 19 – 26% and
- Severe anaemia; P.C.V. $\leq$ 18%.

Patients with anaemia in this study were classified into these 3 groups.

The data generated was entered into the computer using the EPI INFO package. Analysis was done and frequencies and correlations generated. Statistical significance was set at <0.05 using the chi-square test and ANOVA.

Results

Informed consent was obtained from 735 patients between the 1st of June 2000 and 31st of May 2001. The patients were followed up until delivery. out of the 735 patients recruited for the study, only 633 patients (86.1%) presented for delivery at this centre.

Incidence of anaemia

Out of the 735 patients recruited for the study, the incidence of anaemia at booking was 15% using a packed cell volume of less than 30 percent. Eighty-five percent had normal packed cell volumes with 8.2% and 6.8% having mild and moderate anaemia respectively. No patient had severe anaemia at booking. Using the WHO minimum acceptable standard of 33 percent, 51.4% of the patients were anaemic.

The incidence of anaemia in labour using a packed cell volume of less than 30 percent was 10.4% with 6.6% and 3.8% having mild and moderate anaemia respectively. No patient presented with severe anaemia in labour.

Maternal age and parity distribution

The maternal age of the patients ranged between 20 and 44 years with a mean of 31.56 $\pm$ 4.12 years. Five hundred and twenty-eight (83.4%) were aged between 21 and 35 years. The mean ages for the normal, mildly and moderately anaemic patients were 31.21 $\pm$ 4.37, 31.21 $\pm$ 5.38 and 32.25 $\pm$ 2.61 years respectively. This was not statistically significant with a P value > 0.05. The parity ranged between 0 and 7 with a mean of 1.4. Most of the patients (65.9%) were multiparous with 3.3% being grandmultiparous. The rest were primigravid. The mean parity for the normal, mildly and moderately anaemic patients was 1.4, 1.8 and 0.9 with a range of 0 to 6, 0 to 7 and 0 to 2 respectively. This was not statistically significant with a P value > 0.05.

Mean gestational age at booking and delivery

The total mean gestational age at booking was 21.3 weeks and at delivery was 38.7 weeks. The mean gestational age at booking was 21.3 weeks (range 7 – 39), 21.9 weeks (range 12 – 38) and 20.4 weeks (range 9 – 37) for the normal, mildly and moderately anaemic patients respectively, while the mean gestational age at delivery was 38.8 weeks (range 28 – 46) and 38.7 weeks (range 34 – 42) and 37.5 weeks (range 33 – 40). This was not statistically significant with a P>0.05

Table 1 Mode of delivery and pregnancy outcome

	Normal (N=567)		Mild anaemia (N = 42)		Moderate anaemia (N = 24)		Total (N=633)	
	No	%	No	%	No	%	No	%
Mode of Delivery								
Spontaneous Vertex delivery	435	76.8	33	78.6	15	62.5	483	76.3
Assisted breech delivery	3	0.5	0	0	0	0	3	0.5
Forceps delivery	3	0.5	0	0	0	0	3	0.5
Caesarean section	126	22.2	9	21.4	9	37.5	144	22.7
Total	567	100	42	100	24	100	633	100
Fetal outcome								
Live birth	552	97.4	42	100	18	75	612	96.7
Still birth	9	1.6	0	0	6	25	15	2.3
Immediate neonatal death	3	0.5	0	0	0	0	3	0.5
Early neonatal death	3	0.5	0	0	0	0	3	0.5
Total	567	100	42	100	24	100	633	100

Table 2 Mean birth weight, apgar scores and blood loss at delivery

	Normal (N=567)	Mild anaemia N = 42)	Moderate anaemia (N = 24)	Anova
Mean birth Weight (Kg)	3.09 (±0.56) (Range 1-4.5)	2.95 (±0.54) (Range 2.1-3.9)	2.71 ±0.46 (Range 2.0 - 3.4)	P>0.05 N/S
Mean Apgar Score at 1 minute	7.9 (± 1.4)	7.8 (±1.1)	6.4 (± 4.0)	P<0.05 Sig.
Mean Apgar Score at 5 minutes	9.5 (± 1.4)	9.6 (± 0.7	8.6 (± 3.8)	P>0.05 N/S
Mean blood loss at delivery (mls)	239.7 (± 185.6) (Range 50 -1,000)	185.7 (± 90.8) (Range 100 -400)	170.0 (± 84.7) (Range 100 – 300)	P>0.05 N/S

Mode of delivery (Table 1)

Spontaneous vertex delivery occurred in 483 (76.3%) patients. Most of the mildly anaemic patients (78.6%) achieved this as compared with 76.8% and 62.5% of the normal and moderately anaemic patients.

More of the moderately anaemic patients (37.5%) delivered by caeasarean section as compared to the non-anaemic (22.2%) patients. The sample size of the moderately anaemic patients was however too small to perform the Chi-square test.

Fetal outcome

Six hundred and twelve (96.7%) of the patients had live births, 97.4% of the non-anaemic patients compared to 75% of the moderately anaemic patients. All the patients with mild anaemia had live births. The perinatal mortality rate was 33 per 1,000 births. Stillbirths occured more in the moderately anaemic patients (25%) with immediate and early neonatal death occurring only in the normal patients.

Birth weight, Apgar scores and blood loss at delivery (Table 2)

The higher the packed cell volum, the greater the birth weight and better the Apgar scores.

The mean birth weights are as shown. This was however not statistically significant (P value >0.05).

The non-anaemic patients had babies with better Apgar scores at 1 minute compared with the 2 other groups, which was statistically significant (P value <0.05). The mildly anaemic patients had babies with better Apgar scores at 5 minutes compared to the other 2 groups. This was however not statistically significant.

The higher the packed cell volume in labour, the greater the blood loss at delivery. This was however not statistically significant with a P value >0.05.

Discussion

A precise definition of anaemia during pregnancy is confounded by various factors such as altitude, ethnicity, use of iron supplements, and changes in plasma volume during pregnancy. Definitions of anaemia have ranged from haematocrit value of ≤ 34 to haemoglobin of <10gm per deciliter (corresponding to a haematocrit value of 30 percent) to the Centre for Disease Controls month-specific standard[9]. In practice, for more than three decades many of our hospitals use a lower level of 10g/dl or less as indicating anaemia[2] Antenatal anaemia, defined as a maternal haemoglobin of < 10g/dl, has been shown not to adversely affect pregnancy outcome10. This raises the question of whether the diagnosis of anaemia should be redefined.

The incidence of anaemia at booking was 15% (using 10g/dl) and 51.4% using the WHO minimum acceptable standard of 11g/dl. These values are lower compared to a previous study done in Enugu, Nigeria in 1990 of incidences of 30.6% using 10g/dl and 67.4% using the W.H.O minimum[11]. These values show that using the definition for our environment, more than the half of our women would be anaemic. Our values correlate with the World Health Organisation estimate that 50-60% of pregnant women in tropical Africa are anaemic[12] and the incidence of anaemia at booking in Nigeria being between 30 - 50%[13].

The incidence of anaemia reduced to 10.4% in labour as these patients were placed on supplementary iron and folic acid from the time of booking. This level of anaemia occurring during the period of antenatal care suggests that these patients were not taking their haematinics or that these drugs were not having their desired effects or the role of malaria as a cause of anaemia in pregnancy that has been well documented[6,11].

These patients were also on antimalarial prophylaxis. As gestational age increases, the demands of the fetus on the mother generally increaases and she could become anaemic rapidly if there is no replacement.

In our study, we did not find any influence of maternal age on haematocrit levels and this was the same finding in a study done in Tanzania in 1996[14]. They also did not find any influence of parity on haematocrit levels. Multiparity, especially when pregnancies occur in quick succession, has been thought to cause anaemia in pregnancy, but this study like the previous Enugu one did not reveal this.

The mode of delivery and fetal outcome was similar in all the groups. There was a reduction in the birth weight with a reduction in haematocrit. There was however no statistically significant difference in the birth weight, 5th minute Apgar scores and mean blood loss at delivery. There was however statistical significance in the 1st minute Apgar score.

Although there was increase in blood loss with the higher the haematocrit values, this may be as a result of additional measures taken to reduce blood loss at delivery in anaemic patients to prevent excessive blood loss.

From this study, the higher the packed cell volume in

labour, the greater the birth weight, better the Apgar scores but the more the blood loss at delivery.

It is possible that severe anaemia as opposed to low haemoglobin values has adverse consequences on fetal growth and long-term outcome as suggested by Godfrey et al[15]. This would need to be further studied.

Conclusion

Pregnant women should be encouraged to book for antenatal care early to correct any anaemia as gestational age increases. Administration of haematinics and antimalarial prophylaxis are important in order to try to bring maternal haematocrit into the optimal range for pregnancy.

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