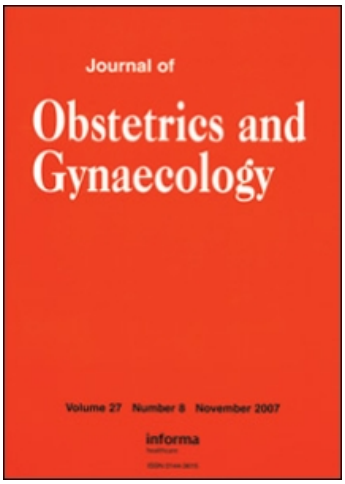

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Morbidity and mortality in sickle cell pregnancies in Lagos, Nigeria: A case control study

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Morbidity and mortality in sickle cell pregnancies in Lagos, Nigeria: A case control study

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Summary
Women with sickle cell disorder are historically known to have significant maternal and perinatal complications but recent studies from developed countries show a change in this trend. This study was a retrospective, case-controlled study of 75 women with haemoglobin SS (HbSS) and 150 with haemoglobin AA (HbAA). Data were analysed using χ^2-test and independent *t*-test as appropriate. There were more perinatal (18.7 vs 8.8, $p < 0.05$) and maternal (5.3% vs 0, $p < 0.05$) deaths in HbSS women compared with HbAA. Birth weight, gestational age at delivery and 1 and 5 min Apgar scores were also significantly lower in the HbSS women. There was no significant difference in the incidence of pre-eclampsia and urinary tract infection between the two groups. Pregnancy in HbSS women is still fraught with maternal and fetal complications. Prospective studies may help clarify the relationship between SCD and specific maternal complications.

Keywords
Maternal, morbidity, mortality, perinatal, sickle cell

Introduction

Sickle cell disease (SCD) is now seen more frequently in pregnancy because of the increased survival of affected women into adulthood. In Nigeria, about 25% of the population carries the sickle cell trait and approximately 100,000 children are born annually with a serious sickle cell disorder (WHO 1994). Although maternal and perinatal mortality has recently been reported to be reduced for women with SCD (Smith et al. 1996; Mou Sun et al. 2001), they are still prone to several complications during pregnancy including anaemia, severe crises, pulmonary disease and infections (El-Shafei et al. 1992; Howard 1996; Ladwig et al. 2000). Perinatal mortality rates are also higher than those for their haemoglobin AA counterparts world-wide (El-Shafei et al. 1992; Serjeant 1992; Howard 1996) and low birth weight is thought to be one of the predisposing factors to this high mortality rate (Serjeant 1992).

Historically, this morbidity rate was found to be high and to include conditions such as pre-eclampsia (Hassel 2005; Oteng-Ntim et al. 2005) and pseudotoxaemia, which is characterised by systolic hypertension, proteinuria and severe bone pain associated with fatal bone marrow embolism (Abudu 2006). Placental abruption, retained placenta and pre- and postpartum infections have also been reported to be high (Hassel 2005).

Recent studies in the USA in centres where a relatively high number of HbSS women are seen in pregnancy, have indicated that the course of pregnancy in these women appears to have changed for the better (Smith et al. 1996; Mou Sun et al. 2001). This is particularly in terms of maternal morbidity and mortality. Also, specific conditions which were thought to be associated with these women, e.g. pre-eclampsia, are now being questioned (Mou Sun et al. 2001).

Several retrospective studies have been done in our environment but not many have studied haemoglobin AA controls as well. Our centre has a long history of caring for HbSS women, both pregnant and non-pregnant. The last study carried out here reported on women who delivered between 10 and 12 years ago (Odum et al. 2002).

This study was therefore carried out to determine the recent morbidity and mortality patterns in pregnant women with hbSS disease in our centre, a developing country, compared with studies done in the past in Nigeria, and recent findings in developed countries.

Methods

This was a retrospective, case-controlled study. The delivery records were examined and the case notes of all pregnant HbSS women delivering between January 1996 and December 2000 were retrieved. The case notes of the next two delivering age- and parity-matched HbAA women were also retrieved.

Data were extracted from them and inserted into a statistical software package – SPSS. Chi-square and exact tests were used to analyse categorical variables, while the independent *t*-test was used for continuous variables.

A total of 75 women with HbSS and 150 women with HbAA were studied. The management of the HbAA

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women was according to the department's protocol for pregnant women with SCD. This includes frequent (fortnightly antenatal clinic visits till the third trimester, then weekly visits) antenatal visits, a rigorous check for and treatment of infections including malaria every visit, prevention and prompt treatment of specific complications such as crises, and blood transfusion with haemoglobin AA blood, when clinically indicated and/or when the haemoglobin concentration drops to 6 g/dl or below. It also includes regular antenatal fetal monitoring and intensive intrapartum and postpartum care of the women and their babies. The women with HbSS are given folic acid 5 mg twice daily and proguanil 200 mg daily for malaria prophylaxis. Iron is only given if there is evidence of iron deficiency. The women with HbAA are given iron, folic acid and sulphadoxine/pyrimethamine, the last for malaria prophylaxis.

Results

The baseline characteristics were similar in both groups (Table I), except for the packed cell volume at booking (PCV). Mean gestational age (GA) at delivery was significantly lower in HbSS than HbAA (36.8 vs 38.4 weeks, $p < 0.0001$).

The distribution of antenatal and intrapartum complications is as shown in Table II. Mode of delivery is as shown in Table III. There were four maternal deaths in the HbSS (5.3%) group and none in the HbAA. The difference was significant, $p < 0.05$. 40% of HbSS women were transfused during their pregnancy compared with 1.9% of HbAA women with a highly significant difference, $p < 0.0001$. Of those transfused, 63% had just 2 units of blood, 10% had 3 units and 27% had $\geq$4 units transfused.

Table I. Baseline characteristics according to phenotype.

	HbAA	HbSS
Age in years (mean)	28.5	28.1
Gestational age at booking (mean)	18	18.2
Parity (median)	0	0
Mean booking PCV	33.9%	22.1%*

*$p < 0.05$ by independent t-test. PCV, packed cell volume.

Table II. Maternal complications according to phenotype.

	HbAA (%)	HbSS (%)
Maternal deaths	0	5.3**
Bone pain crisis	0	25.3*
Severe anaemia	0	5.3*
Pre-eclampsia	5.6	6.7
Eclampsia	1.3	0
IOL	23.9	25.3
Pseudotoxaemia	0	1.3
UTI	1.9	0
PPH	1.3	1.9
Retained placenta	1.3	1.3
Wound breakdown	0	4.2**
Perineal tear	6.9	0**

*$p < 0.05$ by χ^2-test; **$p < 0.05$ by Fisher's exact test. IOL, induction of labour; PPH, postpartum haemorrhage; UTI, urinary tract infection.

Fetal complications are as shown in Table IV and Figure 1. Table V compares some of the outcome measures in this study with previous studies from our environment.

Discussion

Unlike some papers from the USA (Smith et al. 1996; Mou Sun et al. 2001), this study showed that there is still a significantly higher maternal mortality in women with HbSS than HbAA. Apart from the difference in environment and socioeconomic factors, blood transfusion may be a contributory factor. In one of the American papers, 60% of haemoglobin SS women were transfused during the pregnancy on a selective basis and the mean number of units given was 4.6; in our study only 40% of the HbSS women were transfused and most of them received 2 units of blood. Compared with other Nigerian studies (Osinusi and Adeleye 1989; Dare et al. 1992; Ogedengbe and

Table III. Mode of delivery according to phenotype.

Mode of delivery	HbAA (%)	HbSS (%)
Vaginal delivery	79.9	60*
Caesarean section	20.1	38.7*
Emergency CS	18.9	33.3*

*$p < 0.05$ by χ^2-test. CS, caesarean section.

Table IV. Fetal outcome according to phenotype.

	HbAA (mean $\pm$ SD)	HbSS (mean $\pm$ SD)
Birth wt (kg)	3.14 $\pm$ 0.63	2.42 $\pm$ 0.62*
1 min Apgar	7.3 $\pm$ 2.4	5.7 $\pm$ 3.1*
5 min Apgar	8.9 $\pm$ 2.4	7.5 $\pm$ 3.7*
Perinatal mortality	8.8 %	18.7 %**

*$p < 0.05$ by independent t-test, **$p < 0.05$ by χ^2-test.

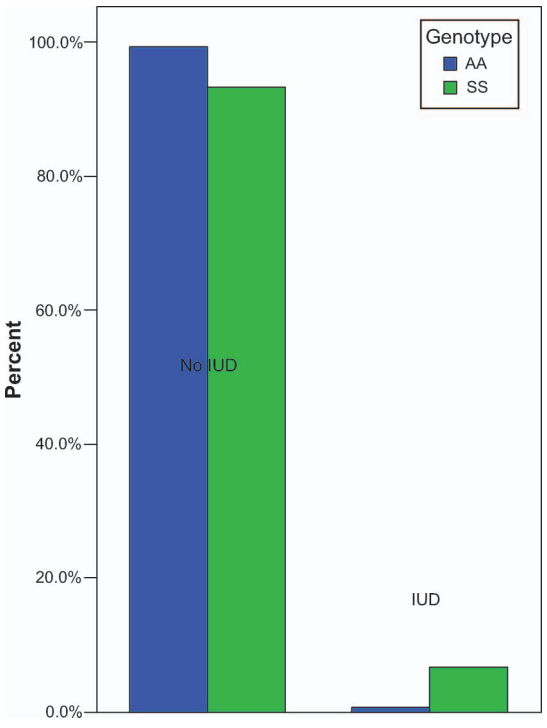

Figure 1. Intrauterine death rate according to phenotype. SS, 7.1%; AA, 0.6%; $p = 0.014$ by Fisher's exact test.

Table V. Comparison of morbidity, mortality and delivery parameters among haemoglobin SS pregnant women in previous Nigerian studies.

	Current study ($n=75$)	Dare et al. 1992 ($n=37$)	Ogedengbe and Akinyanju 1993 ($n=28$)	Osinusi and Adeleye 1989 ($n=78$)	Odum et al. 2002 ($n=60$)
Bone pain crisis	25.3	48.6	89.3	35	41.4
Vaginal delivery	60	56.8	70	64	56.8
Perinatal mortality	18.7	18.5	23.3	18.8	12.1
Maternal mortality	5.3	10.8	12.9	2.6	6.9

Figures are percentages of total number of patients. *n* refers to total number of SS women studied.

Akinyanju 1993; Odum et al. 2002) maternal mortality appears to be better in the current study than most. However, the differences with study parameters such as prophylactic transfusion in one study (Dare et al. 1992), and small numbers in two of the studies (Dare et al. 1992; Ogedengbe and Akinyanju 1993), together with the fact that these are all retrospective studies, do not allow us draw any meaningful conclusions.

On maternal morbidity, the patterns are still the same as in the past. Pain crises appear inevitable for women with this condition, regardless of environment. Despite the fact that a randomised controlled trial on the subject has shown that prophylactic transfusion reduces the frequency of painful crises without affecting perinatal mortality (Koshy et al. 1988), a Nigerian study with such a transfusion policy (Dare et al. 1992) still had a high proportion of women with painful crises.

Urinary tract infection (Seoud et al. 1994) and retained placenta (Serjeant et al. 2004) have been reported as being more common in some studies but this was not seen here. The interesting finding is that of a greater incidence in perineal tear in HbAA women. This could be because greater care is taken during the delivery of HbSS women in order to prevent blood loss, combined with the fact that they had a lower incidence of vaginal delivery and smaller babies. Although women with HbSS have been reported to have a higher risk of pre-eclampsia (Koshy et al. 1988; Oteng-Ntim et al. 2005), we did not find this to be the case in our study. Other studies have also corroborated our findings on pre-eclampsia although like ours, their power was not sufficient to make firm conclusions (Mou Sun et al. 2001; Serjeant et al. 2004). It would be interesting to examine this further in robust prospective studies.

Perinatal mortality, birth weight and 1 and 5 min Apgar scores were worse than with HbAA pregnancies. Gestational age at delivery was also lower, with the mean being <37 weeks, indicating a higher incidence of pre-term delivery in the HbSS women. The perinatal mortality figures are comparable with other studies done in Nigeria (Osinusi and Adeleye 1989; Dare et al. 1992; Ogedengbe and Akinyanju 1993; Odum et al. 2002). Studies from the USA show a reduction in perinatal mortality but a high incidence of low birth weight and premature delivery (Smith et al. 1996; Mou Sun et al. 2001).

Pregnancy in women with sickle cell disease in Nigeria is still fraught with maternal and fetal complications, as well as mortality. Larger studies may help clarify the relationship between sickle cell disorder and specific maternal complications, such as pre-eclampsia.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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