Tropical Journal of Obstetrics & Gynaecology
ISSN-Print: 0189-5117
Online: 2543-148X
Official Publication of Society of Obstetrics & Gynaecology of Nigeria

■ Original Article

Obstetric Challenges of Sickle Cell Disease in Pregnancy

Ohiohin AG,[1] Kalejaiye OO,[2] David AN,[1] Ohihoin EN,[4] Herbertson EC,[1] Gbajabiamila TA,[1] Kalu O,[4] Jimmy S,[4] Agbetoba H,[3] Ezechi OC,[1] Ujah IAO.[5]

[1]*Clinical Sciences Division, Nigerian Institute of Medical Research*
[2]*Department of Medicine, Lagos University Teaching Hospital*
[3]*Lagos Island Maternity Hospital*
[4]*HICI Healthcare, Ikoyi*
[5]*Department of Obstetrics and Gynecology, College of Medicine, University of Jos.*

ABSTRACT

Background: Sickle cell disease in pregnancy is associated with an increased risk of medical, obstetric and fetal complications. Maternal complications are widely varied, notably includes anaemia, pulmonary hypertension, ante partum hemorrhage, premature labor and death. Fetal complications include intrauterine growth restriction, premature delivery, and perinatal mortality.
Method: A list of patients who presented with sickle cell diseases over the 3-year period were generated from the antenatal clinic and in-ward patients. Information on maternal and neonatal events were extracted from their medical records and analysis was done with SPSS for windows version 19.0.
Result: 9,346 pregnant women were managed over the study period, 32 (0.34%) had SCD related complications. The average patient age was 26.30years (range 19-37). 93.33% of the patients had blood transfusion. The genotype of the patients, (HbSS, HbSC), did not significantly influence need for blood transfusion (p=0.017). Mode of delivery did not significantly influence need for transfusion. (p=0.083). Still birth delivery rate was 8.88 %(n=4). Maternal mortality ratio is 11,111 per 100,000 live births.

Conclusion: Pregnancy in sickle cell disease is associated with an abysmally high maternal mortality ratio. This is about twenty times the National average. The need for blood transfusion is high in all the variants of the disease. There is therefore a need to draw attention to critical care during labour and delivery in Sickle cell disease patients in resource constrained settings with a view to improve maternal and perinatal outcome.

Corresponding Author
Dr. Aigbe G. Ohihoin;
aigbe.ohihoin@yahoo.com,
aigbe.ohihoin@nimr.gov.ng

Introduction

Sickle cell disease (SCD) is a group of genetic disorders resulting from the presence of a mutated form of haemoglobin, haemoglobin S (HbS). (HbS) arises from a mutation substituting thymine for adenine in the sixth codon of the beta-chain gene, GAG to GTG.[1] This causes coding of valine instead of glutamate in position 6 of the Haemoglobin beta chain. The resulting haemoglobin has the physical properties of forming polymers under deoxy conditions. It also exhibits changes in solubility and molecular stability. These properties are responsible for the profound clinical expressions of the sickling syndromes.

The clinically important genotypes referred to as sickle cell disease/disorder are HbSS in which there is a homozygousity for the mutation that causes HbS, HbSC sickle haemoglobin C disorder, HbSB+ thal (sickle cell beta plus thalassemia) and HbS/â0 (sickle beta-zerothalassaemia).

HbSC, HbSB+Thal and HbS/â0 are heterozygous states in which the person has only one copy of the mutation that causes HbS and one copy of another abnormal haemoglobin allele. The homozygous HbS disease (HbSS), an autosomal recessive disorder, is the most common form of SCD and has been found to be the most troublesome in terms of severity of clinical manifestations.

Sickle cell disease is associated with an increased risk of medical complications in pregnancy as well as obstetric and fetal complications. Reported maternal complications include anaemia, urinary tract infections, pulmonary hypertension, pre and post-partum painful crises, antepartum haemorrhage, premature labour and death while fetal complications include intrauterine growth retardation, premature delivery, and perinatal mortality.[2]

The increased understanding of basic pathology and management of sickle cell diseases has resulted in improved outcome. The effect of the improved management on the outcome of pregnancy complicated by sickle cell diseases remains controversial and inconclusive. It therefore pertinent to conduct study on maternal and foetal outcome of pregnancies complicated by sickle cell disease in a city with a large population of women with the disease.

Method

It was a retrospective hospital-based study and the study population was pregnant Sickle cell disease patients seen at the Island maternity hospital Lagos, Nigeria. Study period was 3-year period (Jan 2010 -December 2012).

In the study centre Lagos Island Maternity Hospital (LIMH), the management of SCD in pregnancy require additional routines, apart from the routine investigations done for pregnant women. They include the following: routine use of proguanil as anti-malaria prophylaxis; folate supplementation; Iron supplementation for only patients with Iron deficiency anaemia; PCV estimation during each visit; Liver span measurement; and abdominal delivery for Obstetric Indications.

A list of patients who presented with sickle cell diseases over the 3-year period was generated from the antenatal clinic and in patients lying in ward. The hospital number was used to retrieve the patient's folder from the medical records. Information on maternal and neonatal events were extracted. Analysis was with SPSS for windows version 19.0.

Result

The total number of deliveries at Lagos Island Maternity Hospital during the study period Was 9,356 but the number of sickle cell disease (SCD) cases managed during this period was 45. Out of which only 32 case-files were available for analysis, giving a retrieval percentage of 71.11%. The prevalence of SCD in pregnancy is 0.48%. The average age of the patients was 26.28years, while the average birth weight was 2.50kg (Table 1). Though 93.75% of the patients had blood transfusion. (n=30). Transfusion rate was highest amongst those who had HbSS with 53%.

The genotype of the patients, (HbSS, HbSC), did not significantly influence need for blood transfusion (p=0.017) though the Caesarean Section rate was 81.25% (n=26). Route of delivery,

did not significantly influence need for transfusion (p=0.083). In Table 5, the still birth delivery rate was 6.3 %(n=2) amongst the sickle cell patients though it was 12.5 %(n=4) in the study. The percentage of maternal mortality was 15.63 %. (n=5). Major diagnosis during the study, Blood group, Route of delivery of blood group are shown in Tables 2, 3 and 4 respectively.

Table 1: Descriptive Statistics

	Mean
Age	26.28
Foetal Birth Weight (kg)	2.5088
Unit of transfusion	3.14
Gestational Age at delivery	35.68
PCV (Post-delivery) %	24.11
PCV (%)	22.03
Maternal Weight	58.75

Table 2: Major diagnosis during the study

	Frequency	Percent
-	3	9.4
Bone Pain	4	12.5
Emcls for Hbsc Cs + BoH	2	6.3
Vaso-occlusive Crisis in Pregnancy	6	18.8

Table 3: Blood Group

	Frequency	Percent
A	6	18.8
AB	1	3.1
AS	1	3.1
B	3	9.4
B+	1	3.1
O	11	34.4
Hbsc	6	18.8
Hbss	23	71.9

Table 4: Route of delivery of blood group

		A	AB	AS	B	B+	O	Hbsc	Hbss
-	5	2	0	1	0	0	3	0	8
ELLSCS	1	2	0	0	0	0	0	1	2
EMCLS	0	0	0	0	2	0	2	2	2
EMCS	0	0	0	0	0	1	2	2	1
EMLSCS	1	1	0	0	1	0	2	1	4
SDV	2	1	1	0	0	0	2	0	6
Total	9	6	1	1	3	1	11	6	23

Table 5: Baby life status

	Frequency	Percent
Live	19	59.4
Still birth	2	6.3
Total	32	100.0

Discussion

Though the number of the patients with sickle cell anaemia was not large, there was significant information that was obtained during the study; it was observed that there was substantial low birth amongst the women. Neither genotype nor the route of delivery influenced the need for blood transfusion. There was significant maternal mortality in this study.

Factors that affect birth weight of babies born to pregnant women without SCD would certainly affect pregnant women with SCD. A number of factors are reported to have an impact on birth weight these include maternal smoking, high blood pressure or pre-eclampsia, maternal infections (e.g. chorioamnionitis) these are also risk factors for premature labour.[1] In some studies the determining factor of birth weight for both maternal genotypes combined showed strong effects of gestational age maternal genotype and placental weight.[2]

Infections like malaria are important in pregnancy as they could cause a negative impact on the health of the mother and foetus. In malaria endemic areas like Nigeria, malaria is estimated to be responsible for 20% of low-birthweight (LBW) infants and it can cause intrauterine growth restriction which is a risk factor for infant mortality.[3] This can occur as a result of sequestration of malaria parasites in the placenta, and preterm labour, which is related to the symptomatic maternal illness in the third trimester. Nutritional status of the mother, number of antenatal clinic visits, rainy season and sex of the baby has also been indicated to affect birth weight in some studies.[1]

That is why we need to stress the importance of prenatal care. Early attendance allows close monitoring which is likely to improve pregnancy outcomes.[2]

Pregnancy outcome in SC disease does not differ from pregnant women with AA, compared with SS disease there were marginally fewer miscarriages, more live deliveries and greater birth weight.[3]

Red blood cell transfusion have reduced morbidity and mortality for patients with sickle cell disease.[4] It is however important to note that there is almost no evidence that the treatment of anaemia other than with exchange transfusion or judicious use of blood transfusion lowers risk of maternal mortality.[5] Regular blood transfusions are sometimes used in women, who have severe problems in pregnancy related to SCD, in order to improve pregnancy outcome, although their exact role is not clear.[6]

Transfusion though beneficial can lead to erythrocyte alloimmunization.[4] Women show a higher rate of alloimmunization partially explained by exposure through pregnancy .[7]

Though there has been paucity of data that reviewed if there is any significance of the route of delivery and the outcome of pregnancy in SCD. Some studies have shown that sickle cell disease was positively associated with caesarean delivery and inductions.[8]

The causes, and rate of Mortality in pregnancies related to SCD are numerous and vary depending on the region of the world the case is being managed. In sub-Sahara Africa foetal and maternal mortality rates are particularly high.[9] It is however thought that with improved access to blood products and improved access to technology for fetal surveillance, maternal and fetal outcome could improve.

Some studies have suggested that pulmonary thrombosis/embolism is a substantial problem during pregnancy in SCD but does not clarify to what extent the problem is caused by pregnancy itself which is associated with thrombotic haemostatic alterations.[10] However Placental thrombosis does correlate with stillbirth or neonatal death.[10]

It has been observed that women with "SC" genotype have a relatively benign course when not

pregnant, this may result in lower level of compliance with the preventive measures' proposed during the antenatal period, although these women are genuinely at risk in late pregnancy.[9] There have been opposing views to this observation. Contrary to some claims, pregnancy outcome in SC disease is generally benign compared with SS disease .[3]

There are numerous maternal and foetal complications of pregnancy that are more common in SCD, including pre-eclampsia, premature labour and intrauterine growth retardation.[3,11,12] SCD is associated with increased odds to antenatal hospitalization, with modest increase with length of hospital stay (LOS).[12] Pregnancy can exacerbate the frequency of painful crises, particularly in the third trimester and postpartum period.[6] Though Women with sickle cell disease are at greater risk for morbidity in pregnancy, they experience a significant risk of dying in pregnancy and childbirth.[13,14] SCD has remained a severe complicating factor in pregnancy.[15] Despite these factors generally pregnancy outcome is favourable.[16] It is pertinent to note that the clinical status of most SS and SC patients is not seriously affected by pregnancy if these women benefit from active prenatal management.[9]

Conclusion

Pregnancy in sickle cell disease is associated with an abysmally high maternal mortality ratio and poor perinatal outcome. The maternal mortality ratio is about twenty times the National average. The need for blood transfusion is high in all the variants of the disease. There is therefore a need to draw attention to critical care and fetal surveillance during labour and delivery in Sickle cell disease patients in resource constrained settings with a view to improve maternal and perinatal outcome.

Data Availability

The data used to support the findings of this study have not been made available because due to the policy of the study centre Lagos Island Maternity Hospital (LIMH) in order to protect patient privacy.

Conflicts of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

Funding

The research was funded from Author(s) personal contributions.

Reference

1. Rijken M, Rijken J, Papageorghiou A, Kennedy S, VIsser G, Nosten F, et al. Malaria in pregnancy: the difficulties in measuring birthweight. BJOG: An International Journal of Obstetrics & Gynaecology. 2011;118(6):671-8.
2. Thame M, Lewis J, Trotman H, Hambleton I, Serjeant G. The mechanisms of low birth weight in infants of mothers with homozygous sickle cell disease. Pediatrics. 2007;120(3):e686-e93.
3. Serjeant GR, Hambleton I, Thame M. Fecundity and pregnancy outcome in a cohort with sickle cell-haemoglobin C disease followed from birth. BJOG: An International Journal of Obstetrics & Gynaecology. 2005;112(9):1308-14.
4. Yazdanbakhsh K, Ware RE, Noizat-Pirenne F. Red blood cell alloimmunization in sickle cell disease: pathophysiology, risk factors, and transfusion management. Blood. 2012;120(3):528-37.
5. Brabin BJ, Hakimi M, Pelletier D. An analysis of anemia and pregnancy-related maternal mortality. The Journal of nutrition. 2001;131(2):604S-15S.
6. Rees DC, Olujohungbe AD, Parker NE, Stephens AD, Telfer P, Wright J. Guidelines for the management of the acute painful crisis in sickle cell disease. British journal of haematology. 2003;120(5):744-52.
7. Schonewille H, Van De Watering LM, Loomans DS, Brand A. Red blood cell alloantibodies after transfusion: factors influencing incidence and specificity. Transfusion. 2006;46(2):250-6.
8. Barfield WD, Barradas DT, Manning SE, Kotelchuck M, Shapiro-Mendoza CK. Sickle cell disease and pregnancy outcomes: women of African descent. American journal of preventive medicine. 2010; 38(4):S542-S9.
9. Rahimy MC, Gangbo A, Adjou R, Deguenon C, Goussanou S, Alihonou E. Effect of active prenatal management on pregnancy outcome in sickle cell

disease in an African setting. Blood. 2000;96(5): 1685-9.
10. Questions U. BLOOD The Journal of The Amrkan Society of Hematology. 2011.
11. Rees DC, Williams TN, Gladwin MT. Sickle-cell disease. The Lancet. 2010;376(9757):2018-31.
12. Chakravarty EF, Khanna D, Chung L. Pregnancy outcomes in systemic sclerosis, primary pulmonary hypertension, and sickle cell disease. Obstetrics and gynecology. 2008;111(4):927.
13. Villers MS, Jamison MG, De Castro LM, James AH. Morbidity associated with sickle cell disease in pregnancy. American journal of obstetrics and gynecology. 2008;199(2):125. e1-. e5.
14. Asnani MR, McCaw-Binns AM, Reid ME. Excess risk of maternal death from sickle cell disease in Jamaica: 19982007. PloS one. 2011;6(10):e26281.
15. Ngo C, Kayem G, Habibi A, Benachi A, Goffinet F, Galacteros F, et al. Pregnancy in sickle cell disease: maternal and fetal outcomes in a population receiving prophylactic partial exchange transfusions. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2010;152(2):138-42.
16. Sun PM, Wilburn W, Raynor BD, Jamieson D. Sickle cell disease in pregnancy: twenty years of experience at Grady Memorial Hospital, Atlanta, Georgia. American journal of obstetrics and gynecology. 2001;184(6):1127-30.