

Original Research Article

Sickle Cell Disease in pregnancy: Maternal and fetal Outcome in Port Harcourt, Nigeria

Abstract

Background: Medical experts for many years have daunted the occurrence of pregnancy in homozygote sickle cell patients. This is because of associated high risk for mother and fetus.

The aim of this study is to determine the prevalence and **maternal and fetal** outcome of **pregnant** mothers with sickle cell disease at the University of Port Harcourt Teaching Hospital, Nigeria.

Materials and methods: This was a retrospective **observational** study of medical case files of all booked pregnant mothers who attended the antenatal clinic of the University of Port Harcourt Teaching Hospital, Nigeria from January 2007 to December 2011. The parameters extracted from the folders included: age, level of education, hemoglobin genotype, full blood count, malaria parasite, urine analysis and culture, complications of pregnancy, Apgar scores and birth weight.

Results: A total of 4,650 mothers were booked for antenatal care. Eight hundred and forty (18.1%) of them were HbAS, five (0.1%) were HbAC, nine (0.2%) were HbSS and 1 (0.02%) HbSC. Age and gestation at booking were 18–42 years (mean 28.6 ± 2.1) and 9–34 weeks gestation (mean 16.6 ± 3.3), respectively. Malaria and vaso-occlusive crisis were the commonest complications encountered in pregnancy. Twenty percent of

women had induction of labour and 60 % were delivered by emergency caesarean section. Twenty percent had postpartumhaemorrhage. Forty four percent of women delivered before 37 completed weeks. Birth weight below 2500 g occurred in 50% of singleton pregnancies. Two neonates developed transient complications related to maternal opiate exposure postnatally. There were 2(20%) maternal and fetal losses from toxemia of pregnancy.

Conclusion: Pregnancy is uncommon among females with sickle cell disease in Port Harcourt, Nigeria. Sickle cell disease remains a severe complicating factor to pregnancy.

Key Words: Sickle Cell Disease; Pregnancy; maternal and fetal outcome.

INTRODUCTION

Sickle cell disease (SCD) comprises a group of inherited red blood cell conditions that result from the synthesis of variant or mutant haemoglobins [1]. SCD originates in tropical regions as a result of its advantage against malaria [1]. It is predominant among people from African, Asian, Arabian and Mediterranean countries; however, it is a worldwide health problem because of population migration [2]. SCD results in early childhood death if left untreated, and its effect on the burden of health care is being recognized as a global issue in terms of chronic disease.

The sickle mutation (β^S) of the beta-globin locus (HBB) is associated with five "classical" haplotypes [3]. These are named according to their putative geographical origins – Benin, Bantu (Central African), Cameroon, Senegal and Arab. The Benin haplotype is very common (~92%) among the Yoruba in Nigeria [3].

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48 It is a disease of great clinical variability. It is only in the last half of the 20th century that
49 women with SCD have survived to reproduce[4]. Early experience with SCD and
50 pregnancy was a cause for condemnation, and the first report of a successful
51 pregnancy was only in 1931[4]. The first major review, in 1941, reported a 50% fetal
52 loss[4]. Very high maternal mortality rates of 11.5% have been reported from West
53 Africa and from black American groups [5]. These high mortality rates have led to
54 suggestions by medical experts that pregnancy in SCD patients is contraindicated and
55 have advised therapeutic abortion and sterilization[4-6]. The initiation of early
56 aggressive prenatal care has dramatically improved perinatal outcome and reduced
57 maternal mortality to less than 1%[7].

58 In view of that, there have been a number of observational reports on maternal mortality
59 rates and fetal outcome in Africa and some parts of Nigeria[8,9]. There is no
60 documented evidence on prevalence of sickle cell disease among pregnant mothers in
61 our centre, Port Harcourt, Nigeria.

62 The present study was undertaken to assess the prevalence and pregnancy outcome
63 of SCD mothers in Port Harcourt, Nigeria. The result obtained will be used to improve
64 management of sickle cell diseases in pregnancy and reduce the burden of the disease in
65 Port Harcourt, Nigeria.

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67 MATERIALS AND METHODS

68 This was a retrospective cohort study of pregnant women who attended the antenatal
69 clinic of the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Nigeria

from Jan 2006 to December 2011. The UPTH is located in Port Harcourt metropolis, the heart of the Niger Delta region of Nigeria. The topography is that of flat plains with a network of rivers, tributaries and creeks which have a high potential for breeding of mosquitoes.

The information about each pregnancy was collected from the medical case notes of the patient which include haemoglobin genotype, full blood count, malaria parasite, urine analysis and culture, gestational age at delivery, mode of delivery, delivery outcome, birth weight, blood loss at delivery, coexisting medical conditions and complications during pregnancy and labour. Gestational age of the fetus was calculated from the last menstrual period and/or ultrasound dating. Clinical diagnosis of a painful episode was made based on the subjective complaint of pain, overall clinical suspicion, and exclusion of other etiologies of pain based on associated symptoms.

Hemoglobin electrophoresis was done on cellulose acetate in alkaline buffer, using Helena's Electrophoresis System and staining by Ponceus stain. Scanning with Clinician 2 (Helena Laboratories Densitometer) was used for quantitative evaluation of different hemoglobin bands.

Hemoglobin electrophoresis which was carried out without history of blood transfusion during the previous four months was taken into consideration.

Malaria was defined as detection of malaria parasites in thick or thin peripheral blood films in the laboratory in any person (symptomatic or asymptomatic). Vaso occlusive crisis is painful crisis seen in patients with sickle cell disease. Haemolytic crisis is defined as massive hemolysis with severe anemia associated with sickle cell disease. Preeclampsia was defined as a systolic pressure of 140 mm Hg or greater or a diastolic pressure of 90 mm Hg or greater after 20 weeks of gestation in the presence of proteinuria in mothers who were not chronically hypertensive.⁸ While, eclampsia is an acute and life-threatening complication of pregnancy characterized by the appearance

of tonic–clonic seizures (convulsions), usually in a woman who has developed pre-eclampsia.⁸Data were analyzed by the Statistical Package for the Social Sciences (SPSS for windows version 15.0, SPSS Inc.).Descriptive statistics in the form of the frequency and percentage were calculated.

RESULTS

A total of 4,650 mothers were booked for antenatal care. Eight hundred and forty (18.1%) of them were HbAS, five (0.1%) were HbAC, nine (0.2%) were HbSS and 1(0.02%) HbSC. Age and gestation at booking were 18–42 years (mean 28.6 ± 2.1) and 9–34 weeks gestation (mean 16.6 ± 3.3), respectively. Of the mothers with SCD, about 6 (60%) of were primiparous and 4(40%) were multiparous. Also, vaso-occlusive crisis in the form of bone pains was the most frequently encountered crisis in them preconception. Previous blood transfusion was also observed in 5 of themothers. Malaria and vaso-occlusive crisis were the commonest complications encountered in mothers with sickle cell disease (Table 2). Twenty percent of women had induction of labour and 60 % were delivered by emergency caesarean section (Table1). Twenty percent had a postpartum haemorrhage. Forty percent of them were delivered before 37 completed weeks (Table3).Birth weight below 2500 g occurred in 50% of singleton

pregnancies. Of these, two (40%) of them were delivered by mothers with preeclampsia. Two neonates developed transient complications related to maternal opiate exposure postnatally. There were 2 (20%) maternal and fetal losses at 32 and 34 gestational ages (by emergency caesarian section) from toxemia of pregnancy ($p < 0.05$).

DISCUSSION

We found only ten (0.2%) pregnant mothers with sickle cell disease. This is rather small compared to previous Nigerian studies [8,9]. This may mean that many of the affected children die before reaching child bearing age. Also, relative infertility among females with sickle cell disease may play a role as acknowledged in other studies [10,11].

139 It has been documented that pregnant women with sickle cell disease have more
140 frequent crises due to the extra stress of pregnancy[6]. This is because pregnancy is an
141 intense burden on a woman's body, and this incredible strain can easily exacerbate the
142 sickling of red blood cells. When these cells cluster together, they can build up in
143 various organs throughout the body, leading to intense pain. In this study half of the
144 pregnant mothers had vaso-occlusive crisis which was precipitated by infections due to
145 malaria. This finding had been documented by previous Nigerian studies[12,13].

146 Malaria is widely considered a major cause of illness and death in patients with SCA in
147 sub-Saharan Africa[14], but the evidence to support this has been conflicting. Some
148 researchers have reported an association between malaria and admission to hospital,
149 anaemiccrises[15], and mortality[16]; however, these studies were done in areas of high
150 malaria transmission where the finding of anaemia cannot be taken as proof that malaria
151 was the cause of the clinical presentation.

152 Pregnancy in SCD patients is linked with increased risk to both mother and fetus.
153 Several studies have reported very high maternal mortality rates in Africa and from
154 black American groups[17-18]. These high mortality rates have led to propositions by
155 clinicians that pregnancy in SCD patients is contraindicated and have advised
156 therapeutic abortion and sterilization[4]. In our study we found 20% rates of fetal and
157 maternal losses late in pregnancy which is similar to that reported in Jamaica[19].The
158 limited laboratory facilities in our hospital have hindered attempts to investigate the
159 causes of these fetal deaths in more detail. These deaths might have been prevented
160 by inducing labour earlier.

Low birth weight is one of the most consistent finding in infants born to mothers with SS disease[20]. Half of the infants in our study were low birth weight. Several factors such as prematurity, preeclampsia, acute anemic episodes, maternal fetal haemoglobin (HbF) levels, and the number of SS-related complications during pregnancy may be responsible for the low birth weight in mothers[20,21].

Preeclampsia was responsible for the maternal deaths in our study. This is at variance with a Saudi Arabian study where none (of pregnant mothers with sickle cell disease) had preeclampsia[18].The mechanism for preeclampsia remains unclear; multiple factors such as placental ischaemia and endothelial injury have been implicated. It can be treated with bed rest at home or in the hospital, if needed. Delivery of the fetus may be required, if the preeclampsia deteriorates, at gestational age greater than 32 weeks.

Conclusion- The current study suggests that there is high maternal and fetal mortality in pregnant mothers with sickle cell disease. A multidisciplinary team approach to deal with antenatal complications in SCD women will improve pregnancy outcome in these patients.

REFERENCES

1. Serjeant GR. The emerging understanding of sickle cell disease.*British Journal of Haematology* 2001; **112**:3–18.
2. Stuart MJ, Nagel RL. Sickle-cell disease.*Lancet* 2004;364:1343–60.

- 185 3. Flint J, Harding RM, Boyce AJ, Clegg JB: The population genetics of the
186 haemoglobinopathies. *BaillieresClinHaematol* 1998, **11**:1-51.
187
- 188 4.Oteng-Ntim E, Cottee C, Bewley S, Anionwu EN. Sick cell disease in
189 pregnancy.*Current Obstetrics and Gynaecology* 2006;**16**:353–60.
- 190 5.Sun PM, Wilburn W, Raynor BD, Jamieson D. Sick cell disease in pregnancy: twenty
191 years of experience at Grady Memorial Hospital, Atlanta, Georgia. *American Journal*
192 *of Obstetrics and Gynecology* 2001; 184:1127–30.
- 193 6.Villers MS, Jamison MG, De Castro LM, James AH. Morbidity associated with sickle
194 cell disease in pregnancy. *Am J Obstet Gynecol.* 2008;199(2):125.
- 195 7. Sonawane AS, Zodpey SP. Pregnancy outcome in sickle cell disease/trait. *J.*
196 *ObstetGynaecol India* 2005;55:415-418.
- 197 8.Ocheni S, Onah HE, Ibegbulam OG, EzeMI: Pregnancy outcomes in patients with
198 sickle cell disease in Enugu, Nigeria. *Niger J Med.* 2007 Jul-Sep ;16(3):252-5.
- 199 9. Idrisa A, Omigbodun AO, Adeleye JA. Pregnancy in hemoglobin sickle cell patients at
200 the University College Hospital, Ibadan. *Int J Gynaecol Obstet* 1992;38:83-6.
- 201 10. Serjeant GR, Hambleton I, Thame M (2005) Fecundity and pregnancy outcome in a
202 cohort with sickle cell-haemoglobin C disease followed from birth. *BJOG* 112: 1308–
203 1314.
- 204 11. Afolabi BB, Iwuala NC, Iwuala IC, Ogedengbe OK. Morbidity and mortality in sickle
205 cell pregnancies in Lagos, Nigeria: a case control study. *J ObstetGynaecol* 2009;29:
206 104–106.

207 12.Dare F.O., Makinde OO, Faasuba OB. The obstetric performance of sickle cell
 208 disease patients and homozygous hemoglobin C disease patients in Ibadan, Nigeria.*Int J*
 209 *GynecolObstet* 1992;37:163-8.

210 13.Odum CU, Anorlu RI, Dim SI et al. Pregnancy outcome in Hb SS cell disease in
 211 Lagos, Nigeria.*West Afr J Med* 2002; 21:19-23.

212 14.Idrisa A, Omigbodun AO, Adeleye JA. Pregnancy in hemoglobin sickle cell patients
 213 at the university college hospital, Ibadan.*Int JGynecolObstet* 1992;38:83-6.

214 15. Ashley-Koch A, Young Q, Olney RS. Sickle haemoglobin (HbS) allele and sickle cell
 215 disease: a HuGE review. *American Journal of Epidemiology* 2000;151(9):839–45.

216 16. Ikemuna AN, Emodi IJ. Hospital admission of patients with sickle cell anaemia pattern
 217 and outcome in Enugu area of Nigeria. *Nigerian journal of clinical practice* 2007;
 218 10(1):24-29.

219 17.Hendrickes JP, Harrison KA. Pregnancy in homozygous sickle cell anaemia. *Br J*
 220 *ObstetGynecol* 1972;79:396-409.

221 18.Khalifa AM. Pregnancy in sickle cell disease in the Al Hassa region of Saudi
 222 Arabia.*Annals of Saudi Medicine* 2000; 20(5&6): 471-473.

223 19.Poddar D, Maude GH, Plant MJ et al. Pregnancy in Jamaican women with
 224 homozygous sickle cell disease, fetal and maternal outcome. *Br J Obstet Gynaecol* 1986;
 225 93:727-32.

226 20.Serjeant GR, Look Loy L, Crowther M, Hambleton IR, Thame M. Outcome of
 227 pregnancy in homozygous sickle cell disease. *Obstet Gynecol.* 2004;103 :1278– 1285.

228 21. Smith JA, Espeland M, Bellevue R, Bonds D, Brown AK, Koshy M. Pregnancy in
 229 sickle cell disease: experience of the Cooperative Study of Sickle Cell Disease. *Obstet*
 230 *Gynecol.* 1996; 87:199–204

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232 **Table 1: Socio-demographics of the pregnant mothers with Sickle cell disease (n-**
 233 **10)**

Age in yrs (%)	Level of education (%)	G A at booking in weeks (%)	Parity (%)	Mode of delivery (%)
15-19= 3(30)	Primary= 0(0)	0-12= 3(30)	1=4(40)	SVD=4(40)
20-24= 4(40)	Secondary=2(20)	13-28= 6(60)	2=5(50)	C/S=6(60)
25-39=2(20)	Tertiary=8(80)	29-36=1(10)	3=1(10)	
30-35= 1(10)				

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235 **Key: yrs= years; GA= Gestational age**

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Table 2: Complications among Pregnant Mothers with Sickle Cell Disease (n=10)

Complications	Number	Percentage
Malaria	8	80
Vaso-occlusive crisis	5	50
Hyperhaemolytic crisis	3	30
Toxaemia of pregnancy	2	20
Urinary tract infection	2	20

Table 3: Fetal Outcome of Pregnant Mothers with Sickle Cell Disease (n=10)

Fetal outcome	Number	Percentage
Still birth	2	20
Birth asphyxia	2	20
Prematurity	4	40
Low birth weight	5	50