Original Article

Managing sickle cell disease in pregnancy, the success and the challenges: Our experience in a semi-urban tertiary health-care facility, Southwest, Nigeria

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ABSTRACT

Background: Pregnancy complicated by sickle cell disease (SCD) is known to be associated with poor maternal and fetal outcomes. However, the challenges encountered in managing these patients in the rural and semi-urban areas are yet to be evaluated by many of these studies.

Objectives: The objective of the study is to determine the maternal and fetal outcomes of pregnancy complicated by SCD, the importance of the pregestational counseling and care and the challenges faced by the health-care givers in giving them optimal care in Nigeria, especially in rural and semi-urban settings.

Materials and Methods: This is a prospective study. All diagnosed SCD pregnant women seen between May 2013 and April 2016 were recruited into the study, after taking informed consent from them. They were all subjected to the standard management of sickle disease in pregnancy. The antenatal, intrapartum, immediate postdelivery and the puerperal events were documented in structured obstetric data sheets. The information obtained from these data sheets were used to generate a database for analysis.

Results: The total number of the patients recruited into this study was 54. They were all booked patients or those referred from other centers with adequate antenatal records. The incidence of SCD in this study was 1.15% (HBSS; 0.49%, HBSC; 0.55%, and HBCC; 0.11%). The mean maternal ages at booking were 26.35 ± 5.76, 27.12 ± 3.28, and 27.004 ± 0.69 years for HBSS, HBSC, and HBCC, respectively. The mean gestational ages at delivery were 37.43 ± 1.36, 38.58 ± 1.21, and 35.80 ± 0.84 weeks for HBSS, HBSC, and HBCC, respectively. The antenatal bookings were all in the second and third trimesters. Similarly, only 10 (39.96%) had pregestational counseling and care before pregnancy. The patients were mostly middle social class status and with poor antenatal clinic visits.

Discussion: Poor maternal and fetal outcomes were seen more in HBSS than HBSC and HBCC. However, statistical analysis showed statistically significant differences only in the prematurity, preterm labor, and the mean fetal weights. Factors such as pregestational counseling and care, social class, parity, and early antenatal booking play important roles in achieving optimal care and excellent outcomes.

Conclusion: Many authors documented poor maternal and fetal outcomes in pregnancies complicated by SCD. The focus now should be identifying factors that may militate against achieving excellent results from the optimal care of these patients. This we have initiated in this study.

Key words: Antenatal blood transfusion; postpartum blood transfusion; pregestational counseling and care; sickle cell disease in pregnancy; social class; vaso-occlusive crises.

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Introduction

Sickle cell disease (SCD), an inherited autosomal recessive disease, is an abnormality of the red blood cells, as a result of the substitution of one amino acid for another.[1-3] In hemoglobin S, valine a neutrally charged amino acid is substituted for the negatively charged amino acid glutamine acid, while hemoglobin C involves the substitution of lysine for glutamic acid at position 6 of the beta-chain.[1,2,4] The substitutions cause the distortion of the red blood cell when the hemoglobin is deoxygenated. Recurrent deoxygenation and the distortion lead to reduced lifespan from 120 days to 17 days. This results in hemolysis and chronic anemia in these patients.[1,3]

The risk factors for recurrent hemolysis are; infections, dehydration, hypoxic states extreme change of temperature and pregnancy.[3,4] SCD is predominantly seen in people of African descent, although significant populations are found among the southern European, Hispanic Middle East, and Asian Indian descents.[5]

Pregnancy complicated by SCD has been documented by various authors to be associated with increased adverse maternal and fetal outcomes.[6-10] However, none of these studies critically looked at the challenges faced by the health-care givers in given optimal care to them, and importance of pregestational counseling and care. These were critically looked into, in this study, especially in semi-urban health-care facilities where the majority of the patients are semi-illiterates. They are still deeply rooted in their traditional beliefs and taboos.

Materials and Methods

It was a prospective study, carried out in the Department of Obstetrics and Gynecology State Specialist Hospital, Asubiaro, Osogbo, Osun state, Nigeria. All the diagnosed SCD pregnant women, seen between May 2013 and April 2016 were recruited into the study population after an informed consent was taken from each of the patients. These patients and their babies were monitored through the antenatal, intrapartum, postpartum, and the puerperal periods.

However, the patients with coexisting chronic medical conditions such as chronic renal failure, bronchial asthma, diabetes mellitus, and chronic hypertension, patients with coexisting uttering fibroids more than 5 cm in diameter, pregnancies achieved through assisted conception, maternal age of <18 years or more than 40 years and unbooked patients with inadequate antenatal record from the referring centers were excluded from the study.

The antenatal, intrapartum, immediate postpartum, and puerperal events were documented in structured obstetrics data sheet. The information obtained were used to generate database. The data was subjected to statistical analysis with a personal computer using SPSS version 20.0 (SPSS IBM Corp, Armonk, NY) and GraphPad InStat 3 (GraphPad Software Inc., San Diego, CA). Chi-square test was conducted to determine associations between variables. P-value < 0.05 was considered significant.

Results

A total of 54 pregnant women with SCD were seen and managed during the study. Twenty-three (42.59%) were HBSS, 26 (48.15%) were HBSC and 5 (9.26%) were HBCC. The total deliveries during this period were 4,758, given an incidence of SCD in pregnancy in our center at 1135/100,000 deliveries or 11.35/1000 deliveries (HBSS; 4.83, HBSC; 5.46, and HBCC; 1.05/1000 deliveries).

The mean maternal ages were 26.35 ± 5.785, 27.12 ± 3.28 and 27.00 ± 4.69 years for HBSS, HBSC, and HBCC, respectively. There was no statistically significant difference between the groups when they were compared in term of maternal age [Table 1]. Majority of the patients belong to the social Classes II and III (middle-class status or average income) 91.13%, 92.30%, and 80%, for HBSS, HBSC, and HBCC, respectively[11] [Table 1 and Figure 1].

Late antenatal care booking was a common feature. None of these patients booked for antenatal care during the first trimester. All the antenatal clinic bookings were during the second and the third trimesters [Table 1]. Antenatal clinic visits were not impressive, because a remarkable number of the patients had poor antenatal clinic visits, especially among the HBSS and HBSC. When the groups were compared in terms of the gestational ages at booking and the number of antenatal clinic visits, there was no statistical significance difference between them [Table 1].

Most of the patients were not opportune to have pregestational counseling. Thus, there was no pregestational care in most of the patients; HBSS 20 (86.96%), HBSC 16 (73.08%), and HBCC 5 (100%). The patients were mostly of parity of 0–2; HBCC 21 (91.30%), HBSC 23 (92.31%), and HBCC 2 (40.00%). However, two of the patients with HBSS were of parities of four and five. Most of them delivered at term except 5 (21.74%) of the HBSS and 1 (3.85%) of the HBSC that had preterm deliveries [Table 1]. There were statistically significant differences between the groups when they were compared in terms of parity, pregestational counseling and care and the gestational age at delivery.

Table 1: Maternal characteristics of pregnant sickle cell disease women in State Specialist Hospital Asubiaro, Osogbo, Nigeria

Parameters	HBSS ($n=23$), n (%)	HBSC ($n=26$), n (%)	HBCC ($n=5$), n (%)	P
Mean maternal age at booking±SD	26.35±5.785	27.12±3.28	27.0±4.69	>0.500
Maternal age				
<20	-	1 (3.85)	2 (40.00)	>0.300
20-25	07 (30.43)	4 (15.38)	1 (20.00)	
26-30	11 (47.83)	15 (57.69)	1 (20.00)	
31-35	4 (17.39)	5 (19.23)	1 (20.00)	
>35	1 (4.35)	11 (3.85)		
Gestational age at booking (weeks)				
<13	-	-	-	>0.05
14-28	14 (60.87)	12 (46.15)	5 (100.00)	
29-36	9 (39.13)	14 (53.85)	-	
Social class				
I	1 (4.35)	1 (3.85)	-	>0.50
II	10 (43.48)	9 (34.61)	1 (20.00)	
III	11 (47.83)	15 (57.69)	3 (60.00)	
IV	1 (4.85)	1 (3.85)	1 (20.00)	
V	-	-	-	
Pregestational counseling				
Yes	3 (13.04)	7 (26.92)	5 (100.00)	<<0.001*
No	20 (86.96)	19 (73.08)		
Parity				
0	12 (52.17)	13 (50.00)	2 (40.00)	<0.01*
1-2	9 (9.13)	11 (42.31)	-	
3-4	1 (4.85)	2 (7.69)	3 (60.00)	
>5	1 (4.85)	-	-	
Gestational age at delivery (weeks)				
28-33	-	-	-	>0.05
34-36	5 (21.47)	1 (3.85)	-	
37-40	18 (78.26)	22 (84.61)	4 (80.00)	
>40	-	3 (11.54)	1 (20.00)	
Number of ANC visits				
1-2	7 (30.43)	5 (19.23)	1 (20.00)	<0.50
3-4	11 (47.83)	11 (42.31)		
>5	10 (21.74)	10 (38.46)	4 (80.00)	
Stable PCV (%)				
<20	-	-	-	>0.05
21-25	12 (52.17)	7 (26.92)	1 (20.00)	
26-30	11 (47.83)	19 (73.08)	4 (80.00)	

*Level of significant is $P < 0.05$. ANC, antenatal care; PCV, packed cell volume; SD, standard deviation

Although the stable packed cell volumes for the patients showed higher values of 26%–30% (hemoglobin concentration 8.67–10 g/dl) for the three groups (HBSS: 11 [47.83%], HBSC: 19 [73.08%], and HBCC: 4 [80.00%]). However, there was no statistically significant difference when the groups were compared in term of the stable packed cell volume [Table 1]. It was observed that poorer maternal outcomes were observed in the women with HBSS, but there was no statistically significant difference in between the groups in terms of most of the maternal outcomes except for the preterm labor and preterm deliveries: $P < 0.001$ [Table 2].

Table 3 shows that there were more poor fetal outcomes among women with HBSS genotype. However, only the mean fetal weight and prematurity showed statistically significant differences when the groups were compared in terms of the fetal outcome measures.

The pregnant women with SCD who did not receive pregestational counseling and care showed poorer materno-fetal outcomes. However, there were no statistically significant differences in most of the materno-fetal outcomes among the groups, except for the routes of deliveries; $P < 0.02$ [Table 4].

Discussion

Many authors have documented that pregnancies complicated by SCD are associated with poor outcomes.[4,5,8-10,12-14] Most

Table 2: Comparing maternal outcomes in women with pregnancy complicated by HBSS, HBSC, and HBCC in State Specialist Hospital, Asubiaro, Osogbo

Maternal outcomes	HBSS (*n*=23), *n* (%)	HBSC (*n*=26), *n* (%)	HBCC (*n*=5), *n* (%)	*P*
Preterm labour/deliveries	5 (21.74)	1 (3.85)	-	<<0.001*
Antenatal admissions	7 (30.43)	6 (23.8)	-	>0.30
Antenatal blood transfusion	4 (17.39)	-	-	>0.05
Vaso-occlusive crisis	7 (30.43)	4 (15.38)	-	>0.20
Infections (UTI, URTI)	4 (17.39)	1 (3.85)	-	>0.10
Preeclampsia/eclampsia	2 (8.70)	-	-	>0.20
Route of delivery				
Vaginal delivery	14 (60.87)	21 (80.77)	5 (100)	>0.10
Cesarean sections	8 (34.78)	4 (15.28)	-	>0.10
Vacuum deliveries	2 (8.70)	-	-	>0.20
Postpartum blood transfusion	6 (26.09)	2 (7.70)	-	>0.10
Maternal mortalities	1 (4.35)	-	-	
Primary PPH	-	-	-	
Types of Gestation				
Singleton	21 (91.3%)	26 (100%)	5 (100%)	
Multiple	2 (8.70%)	-	-	

*Level of significant is $P < 0.05$, The mean age of the patients in this study was 28.54 years (19-40 years). UTI, urinary tract infections; URTI, upper respiratory tract infections; PPH, primary postpartum hemorrhage

Table 3: Comparing Foetal Outcomes in Women with Pregnancy Complicated by HBSS, HBSC and HBCC in State Specialist Hospital Asubiaro, Osogbo

Foetal outcomes	HbSS (*n*=23) (No %)	HbSC (*n*=26) (No %)	HbCC (*n*=5) (No %)	*P*
Mean gestation age at delivery	37.43+1.36	38.58+1.21	39.80+0.84	>0.50
Prematurity	5 (21.74)	1 (3.85)	-	<0.001*
IUGR	4 (17.39)	2 (7.70)	-	>0.30
low birth Weight	4 (17.39)	2 (7.70)	-	>0.30
Stiff births	1 (4.35)	1 (3.85)	-	>0.30
Birth asphyxia	6 (26.09)	7 (26.92)	-	>0.30
SCBU admissions	6 (26.09)	3 (11.54)	-	>0.10
Neonatal jaundice	-	-	-	
Early neonatal deaths	-	-	-	-
Total	26	16	-	-
Mean Foetal Wt. (Kg). +SD	2.59+0.324	2.89+0.330	3.04+0.303	<0.05*

Statistically Significant values ($P<0.05$). ***Some of the patients had more than 1 foetal complication. Birth Asphyxia: APGAR Score <6. IUGR, Intrauterine Growth Restriction; LBW, Low birth weight; SCBU, Special care baby unit; SD, Standard deviation

of these studies were retrospective, and the different genotypes (HBSS, HBSC, and HBCC) of the patients were not taken into consideration. The patients were grouped together as an entity; SCD. Second, the studies mainly compared SCD pregnant women, with non-SCD pregnant women. Possible factors for improved care and challenges encountered were also not evaluated. These were critically evaluated in this study.

The incidence of SCD in pregnancy varies significantly in different parts of the world. The incidence of SCD in pregnancy in this study was 11.34/1000 deliveries. Omo-Aghoja and Okonofua reported an incidence of 8.7/1000 deliveries in Benin, Nigeria. Muganvizi and Kidanto reported an incidence of 95/100,000 (0.95/1000) deliveries in Muhimbili, Tanzania, while Al Jama *et al*. reported an incidence of 13/1000 (1.3%) deliveries in eastern Saudi Arabia.[5,12,13]

Most of the patients booked in the second and the third trimesters. None of the patients booked during the first trimester. Similarly, poor antenatal clinic visits; such as noncompliance with appointments and irregular antenatal clinic visits were also observed. These are common features in antenatal clinics in our environment. The challenges in this group of people is identifying and managing sickle cell crises during the first trimester and also instituting fetal therapy where necessary.

We transfused our SCD pregnant women when there were clear indications, for blood transfusion, many studies supported our line of management.[4,6,9,15,16] Blood transfusions exposes the pregnant women and their unborn babies to serious complications such as alloimmunization, immediate blood transfusion reactions, risk of infections such as HIV, Hepatitis B or C, iron overload. However, Cunningham *et al*. reported an appreciable reduction in maternal morbidities and perinatal mortalities, but with no effect in perinatal morbidities.[17]

In this study, spontaneous vaginal delivery at term was our goal, unless there were obstetrics indications to do otherwise to optimize maternal and neonatal outcomes. Thus, 40 (74.08%) had vaginal deliveries, 12 (22.22%) had cesarean sections, and 2 (3.70%) had Vacuum deliveries. Although Kuo *et al*. reported that delivery at 38 weeks'

Table 4: Impact of pregestational counseling and care on the Materno-fetal outcomes in pregnancies complicated by sickle cell disease (HBSS, HBSC, and HBCC)

Outcome measures	Yes ($n=10$), n (%)	No ($n=44$), n (%)	P
Fetal outcomes			
Prematurity	1 (10.00)	5 (11.36)	>0.90
IUGR	0	6 (13.64)	>0.20
LBW	2 (20.00)	5 (11.36)	>0.30
Birth asphyxia	4 (40.00)	9 (20.45)	>0.20
SCBU admissions	2 (20.00)	7 (15.91)	>0.70
Stillbirth		2 (4.55)	>0.30
Neonatal sepsis			
Maternal outcomes			
Antenatal admissions	1 (10.00)	12 (27.27)	>0.20
Antenatal blood transfusion	0	4 (9.09)	>0.30
Vaso-occlusive crisis	0	11 (25.00)	>0.05
Urinary tract infection	1 (10.00)	4 (9.09)	>0.95
Preeclampsia/eclampsia	0	2 (4.55)	>0.30
Routes of delivery			
Cesarean section	3 (30.00)	9 (30.45)	>0.50
Vaginal delivering	7 (70.00)	33 (75.00)	<0.02*
Vacuum delivering		2 (4.55)	>0.30
Postpartum transfusion	1 (10.00)	7 (15.91)	>0.80
Maternal mortality	1 (10.00)	-	>0.3

*Statistically significant values ($P<0.05$). IUGR, intrauterine growth restriction; LBW, Low birth weight; SCBU, Special care baby unit

optimizes maternal and neonatal outcomes.[18] However, strict adherence to delivery at 38 weeks, may require induction of labor, with it attendant risks of failed induction of labor and interventions in labor.

We observed that the majority of the SCD patients; 44 (81.48%) during this study did not receive preconception counseling and care, which are strong factors in optimizing their care and improve outcome. Medical condition such as pulmonary hypertension is a contraindication to pregnancy in these patients.[19,20] Patients with chronic medical conditions such as diabetes mellitus, hypertension, recurrent episodes of vaso-occlusive crises, acute chest syndrome coexisting with SCD require stabilization and modification of their drugs before pregnancy. All patients with hemoglobinopathy require mandatory referral for preconception care.[21,22]

In this study, we recorded 100%, hospital deliveries from our recruited and managed SCD patients. However, patients with HBSS in pregnancy were associated with the poorest maternal and fetal outcomes as compared with those with HBSC and HBCC. This was similar to what was reported by Elenga *et al*.[23] However, many of the previous authors compared SCD pregnant women with non-SCD pregnant women and not among the different genotypes.[5,8,9] We also recorded two cases of perinatal mortalities, each from HBSS and HBSC, but none from HBCC pregnant women. The perinatal

A. Husband's Occupation.
Scores: 1. Professional, top civil servants, politicians and business man.
2. Middle-level bureaucrats, technicians, skilled artisans and well to-do traders.
3. Unskilled workers and those in general whose income would be at or below the minimum wage.

b. Level of Educational Attainment (Wife).
Scores. 0. Education up to university level.
1. Secondary or tertiary level below the university level e.g college of education, school of nursing etc.
2. No schooling or up to primary level only.

SOCIAL CLASS = Score A + Score B.

Courtesy: Olusanya .O, Okpere E, Ezimokhai M. (WA. J. Med. 1995; 4:4)

Figure 1: Scoring System for Social Class of the parturients

mortality rate in this study was 37/1000 births. This was lower than the values from other centers.[5,12,14] We recorded 1 (4.35%) maternal mortality among the HBSS patients. Thus, the case fatality rate was 18.52%. This was lower than what were reported from other centers in Nigeria.[5,12,24,25] This may be due to the fact, that these previous studies were retrospective, and there were no predetermined standard or protocol for managing these patients. In this study, the patients were subjected to the same level of standard care.

We also, observed in this study, that five patients presented in the advanced first stage of labor, with full cervical dilatation at presentation and delivered within 30 min of arrival in the labor Ward. This was due to the misconception that a long period of stay in labor Ward will result in unnecessary interventions in labor, especially cesarean sections.[26]

The challenges faced in managing these patients were, poor or no pregestational counseling and care, late antenatal clinic booking and attendance, late presentation in labor, poor acceptance of contraceptions based on their sociocultural beliefs. Some of these manifested in a grand multipara and a para 4 women that absconded after counseling on contraception.

Conclusion

Many authors documented poor maternal and fetal outcomes in pregnancies complicated by SCD. Those studies made some impacts on improving the outcomes. However, studies

identifying factors that will militate against achieving excellent results from the optimal care of these patients should be the present focus of researchers. This we have initiated in this study.

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Conflicts of interest

There are no conflicts of interest.

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