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Major Sickle Cell Disease and Pregnancy: Epidemiology and Prognosis, Based on 65 Cases at Bogodogo University Teaching Hospital (CHU-B)

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Abstract

Goal: The goal of this study was to study the epidemiological, clinical, therapeutic and prognostic aspects of sickle cell disease and pregnancy at Bogodogo University Teaching Hospital (CHU-B) in Burkina Faso. **Materials and Methods:** This was a cross-sectional retrospective study at the Bogodogo University Teaching Hospital (CHU-B) in Burkina Faso over a period of 18 months, from March 15, 2018, to September 15, 2019, among pregnant women who have major sickle cell disease and pregnancy and consulting in the obstetrics and gynecology department of CHU-B. The data were collected mainly from patients' medical records using a standardized data collection form. The parameters analyzed were the gynecological obstetrical antecedents related to sickle cell disease, physical examination findings, maternal, fetal complications etc. **Results:** Sixty-five (65) patients were included in the study. The average age of women was (25.6 ± 5.7 years old). The majority of patients were paucigestes 69.2% and primipara 55.4%. Sickle cell disease was accidentally discovered in 24.6% of our patients during pregnancy and 21.5% of women have a history of transfusion. The complications of sickle cell disease in the pregnancy were dominated by vaso-occlusive crises which involved seventy-two point three percent (72.3%). One of the chronic complications found is retinopathy 6.1%. Postpartum complications related to sickle cell disease were anemia 38.4%. The fetal complications were: 4.6% growth retardation, intra uterine fetal death 9.2%, neonatal death 6.1%, abortion 1.5%. The hemoglobin phenotype was 89.2% HbSC and 10.8% HbSS. Blood transfusion of RGC was performed in 32.3% of patients. Type of delivery: Cesarean section 60.4%, vaginal delivery 39.6%. The case-fatality proportion was 9.2%. **Conclusion:** The association of major sickle cell disease and pregnancy is responsible for significant maternal

and fetal morbidity and high case-fatality proportion. Regular medical monitoring and management are necessary.

Keywords

Sickle Cell Disease, Pregnancy, Prognostic, Burkina Faso

1. Introduction

Sickle cell disease (SCD) is a hereditary hemoglobin disorder and the most common genetic disease worldwide [1]. It is an autosomal recessive condition characterized by the presence of an abnormal hemoglobin known as hemoglobin S (HbS) [2]. Under conditions of reduced oxygen tension, HbS polymerizes, causing red blood cells to become rigid and assume a characteristic sickle shape. This process leads to vaso-occlusion, resulting in painful crises and chronic hemolytic anemia [3].

SCD predominantly affects populations originating from sub-Saharan Africa, the Caribbean, the Middle East, and North Africa. It remains the most prevalent genetic disorder in sub-Saharan Africa and in regions such as Guadeloupe [4].

In developed countries, advances in the understanding and management of SCD have considerably improved both life expectancy and quality of life, allowing many affected women to reach reproductive age and consider pregnancy [5]. In contrast, significant challenges remain in developing countries regarding the monitoring and management of pregnant women with SCD. Pregnancy is considered a high-risk condition for both the mother and the fetus. It may exacerbate the clinical manifestations of SCD, while the disease itself can adversely affect fetal growth and pregnancy outcomes. Consequently, close antenatal surveillance is essential for women with SCD [4].

Pregnancy in women with SCD, regardless of genotype (HbSS, HbSC, HbS/β-thalassemia, etc.), is associated with a substantially increased risk of maternal and perinatal morbidity and mortality [6]-[8]. Maternal complications include vaso-occlusive crises, severe anemia, infections, preeclampsia, and thromboembolic events, while fetal complications include intrauterine growth restriction, prematurity, low birth weight, and perinatal death.

In Burkina Faso, pregnancy among women with sickle cell disease continues to be associated with high rates of maternal and perinatal morbidity and mortality [9].

Therefore, we conducted this study to determine the epidemiological and prognostic profile of pregnancies complicated by major sickle cell disease at Bogodogo University Teaching Hospital, with the aim of contributing to the identification of strategies to improve the quality of care provided to this vulnerable population.

The overall objective of this study was to assess the epidemiological, clinical, therapeutic, and prognostic aspects of the association between major sickle cell disease and pregnancy at Bogodogo University Teaching Hospital between March 15, 2018, and September 15, 2019. Specifically, the study aimed to determine the prevalence of pregnancy among women with major sickle cell disease and to describe

their sociodemographic characteristics, clinical and laboratory features, therapeutic management, and maternal and perinatal outcomes during the study period.

2. Materials and Methods

This was a cross-sectional retrospective study with descriptive and analytical objectives, conducted from March 15, 2018, to September 15, 2019, at Bogodogo University Teaching Hospital (CHU-B) in Burkina Faso.

Eligible pregnant women were enrolled consecutively during the study period. Data were collected through a standardized data collection form after admission or hospitalization. No systematic postpartum follow-up beyond what is required in postpartum was conducted after discharge from the hospital.

A total of 65 pregnant women were included in the study. The number of participants included in some analyses in the study varied depending on the availability of the corresponding data. Each woman was counted only once in the study, regardless of the number of hospitalizations during the study period.

Participants eligible for the study were pregnant women of any age with major sickle cell disease confirmed by laboratory tests, including homozygous HbSS sickle cell disease and compound heterozygous states in which hemoglobin S is associated with another abnormal hemoglobin (C, D, or O-Arab or β-thalassemia), who presented with complications related to pregnancy or major sickle cell disease, and who had provided informed consent to participate in the study. For participants under the age of 18, consent from a parent or guardian was also obtained. Patients were excluded when a discrepancy was identified between the clinical findings and the laboratory results reported by the laboratory, making confirmation of the diagnosis uncertain.

The data were collected mainly from patients' medical records using a standardized data collection form.

The variables studied included epidemiological characteristics, maternal complications related to major SCD, pregnancy outcomes, mode of delivery, neonatal anthropometric parameters at birth, and maternal and neonatal outcomes during the postpartum period.

Data were entered, processed, and analyzed using Epi Info software version 7.2.2.6. Results were expressed as frequencies and percentages for categorical variables and as means ± standard deviations for continuous variables. Comparisons of proportions and means were performed using the chi-square test, corrected chi-square test when appropriate, Student's t-test, and Fisher's exact test. Statistical significance was set at a p-value < 0.05.

The anonymity of the patients and the confidentiality of the information extracted from their medical records were maintained throughout the study.

3. Results

3.1. Prevalence

During the study period, we admitted 9656 women, including 65 pregnant women

with sickle cell disease. The hospital-based admission prevalence of the sickle cell at the obstetrics and gynecology department of CHU-B was 0.67% within the study period.

3.2. Sociodemographic Characteristics of Patients

3.2.1. Maternal Age

The mean age of our patients with major sickle cell disease (SCD) was 25.6 ± 5.7 years, ranging from 13 to 38 years. The modal age was thirty (30) years. The age group between 25 and 35 years was the most represented (49.2%). The distribution of patients by age group is illustrated in Figure 1.

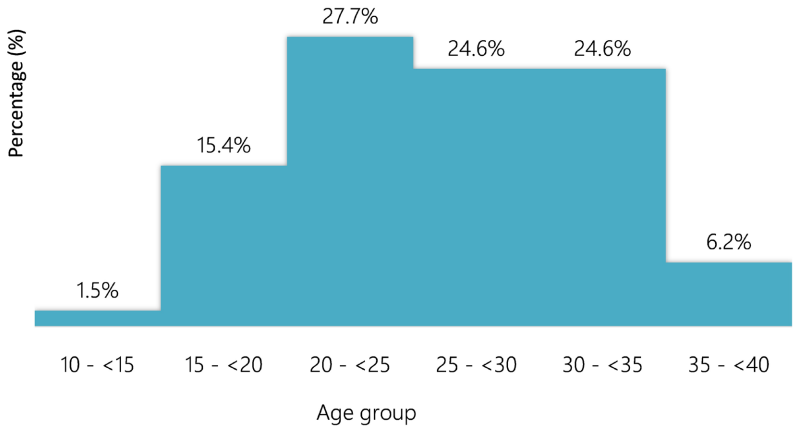

Figure 1. Distribution of patients by age group.

3.2.2. Distribution of Patients According to Other Sociodemographic Characteristics

Table 1 presents the sociodemographic characteristics of the 65 patients included in the study. The majority of the patients were housewives (66.1%) and married (70.8%). Regarding educational attainment, 22 patients (33.8%) had completed secondary school. The majority of patients were from urban areas (70.8%).

Table 1. Distribution of patients according to other sociodemographic characteristics (n = 65).

Variables	Frequency	%
Occupation		
Housewives	43	66.1
Civil servants	4	6.1
Informal sector	11	17
Other	7	10.8
Marital status		
Single	2	3.1
Living with a partner	17	26.1
Married	46	70.8

Continued

Education		
No schooling	21	32.3
Elementary school	15	23.1
High school	22	33.8
Higher education	7	10.8
Place of origin		
Urban	46	70.8%
Rural	19	29.2%
Total	**65**	**100**

3.3. Gynecological and Obstetric History

The distribution of patients according to their gynecological and obstetric history is shown in Table 2.

Table 2. Distribution of major SCD patients by gynecological and obstetric history.

Variables	Frequency	%
Number of pregnancies		
Primigravidas	9	13.8
Paucigravidas (2 or 3)	45	69.2
Multigravidas (≥4)	11	17
Parity		
Nulliparous (0)	7	10.7
Primiparous (1)	36	55.4
Pauciparous (2 or 3)	16	24.6
Multiparous (≥4)	6	9.3
Miscarriages		
0	58	89.3
1	5	7.7
2	1	1.5
3	1	1.5
Live births		
0	22	33.8
1	30	46.1
2	7	10.8
3	2	3.1
4	4	6.2

Continued

Stillbirths		
0	51	78.46
1	12	18.46
2	2	3.07
Total	**65**	**100**

3.4. Some Clinical Aspects

At the admission, all patients were conscious except for one patient who was in a deep coma with a Glasgow Coma Scale score of 5 (E1V1M3). With regard to general health status, the distribution of patients has been done according to the World Health Organization "performance status". Table 3 presents the main clinical characteristics of the patients at the time of admission.

Table 3. Breakdown of patients based on general examination findings and vital signs (n = 65).

Variables	Frequency	%
General condition		
Stage 1	46	70.8
Stage 2	17	26.2
Stage 3	1	1.5
Stage 4	1	1.5
Stage 5	0	0
Conjunctiva		
Coloured	44	67.7
Slightly coloured	19	29.2
Pale	2	3.1
Blood pressure		
Systolic blood pressure		
Hypotension < 90	1	1.5
90 - <140	55	84.6
Hypertension ≥ 140	9	13.8
Diastolic blood pressure		
Hypotension < 60	1	1.5
60 - 90	57	87.7
High blood pressure ≥ 90	7	10.8
Total	**65**	**100**

Temperatures ranged from 36.5˚C to 37.2˚C. Two patients had a temperature above 38˚C.

3.5. Mode of Delivery

A total of 65 pregnant women were included in the study. Of these, 48 (39.4%) carried their pregnancies to term, while 17 did not give birth during the study period, either due to a miscarriage or because their pregnancies were still ongoing at the end of the observation period. Analyses of mode of delivery and neonatal outcomes were therefore conducted among the 48 women who gave birth.

The mode of delivery (n = 48) was vaginal in thirty-nine point four per cent (39.4%) of cases. Cesarean section accounted for sixty point six per cent (60.6%).

Eighty percent (80%) of cesarean sections were performed as emergencies, while twenty percent (20%) were prophylactic (n = 29).

3.6. Data on Complications

3.6.1. Complications of Sickle Cell Disease during Pregnancy

❖ Types of complications

Anemia, vaso-occlusive crises (VOCs), and infections were the most frequently observed complications among the 65 pregnant women included in the study, affecting 72.3%, 72.3%, and 32.3% of patients, respectively. Acute chest syndrome was diagnosed in 9.2% of cases.

As shown in Table 4, malaria accounted for 71.4% of all infectious episodes recorded during pregnancy. Overall, 47 of the 65 patients (72.3%) experienced at least one vaso-occlusive crisis during pregnancy.

The distribution of patients according to the type of infection and the number of vaso-occlusive crises experienced during pregnancy is presented in Table 4.

Table 4. Distribution of patients according to the nature of the infection (n = 21) and the number of VOCs (n = 47).

Nature of the infection and number of vaso-occlusive crises	Frequency	%
Nature of the infection		
Unknown	2	9.5
Malaria	15	71.4
Interstitial pneumonia	1	4.7
Severe sepsis	1	4.7
Vulvovaginitis	2	9.5
Total	**21**	**100**
Number of vaso-occlusive crises		
1	9	19.1
2	21	44.7
3	12	25.5
4	5	10.7
Total	**47**	**100**

❖ Obstetric complications

The obstetric complications observed (n = 65) included hypertension (18.4%), pre-eclampsia (3.1%), eclampsia (3.1%) and threatened preterm labour (TPL) (1.5%).

3.6.2. Complications of Sickle Cell Disease in the Postpartum Period

❖ Types of complications

Anemia, vaso-occlusive crises and infections were the most frequently encountered (n = 65), at 38.4%, 24.6% and 10.7% respectively. Hemorrhage occurred in 6.1% of cases and acute chest syndrome in 3.1%.

❖ Nature and number of infections

The patients concerned had experienced a single episode of infection in the postpartum period.

The distribution of patients according to the nature of the infection in the postpartum period is shown in Table 5.

Table 5. Distribution of patients according to the nature of the infection (n = 7).

Nature of the infection	Frequency	%
Septic shock	1	14.2
Malaria	2	28.5
Interstitial pneumonia	1	14.3
Infectious syndrome	2	28.5
Severe sepsis	1	14.3
Total	**7**	**100**

3.7. Laboratory Findings

3.7.1. Hemoglobin Phenotype

Hemoglobin electrophoresis (n = 65) showed a predominance of HbSC (n = 65), which accounted for eighty-nine point two per cent (89.2%). The other was HbSS. Hemoglobin electrophoresis was used for hemoglobin phenotyping n = 65.

3.7.2. Rhesus Blood Group

The distribution of patients according to Rhesus blood group is shown in Figure 2.

The most common Rhesus blood group was Rhesus-positive group O (O+), accounting for forty-seven point seven per cent (47.7%) n = 65.

3.7.3. Complete Blood Count

The mean hemoglobin level was 8.9 ± 1.9 g/dL, with ranges from 2.9 to 12.5. The mean corpuscular volume was 79.8 ± 8.6 fL, with ranges from 55 to 95. We observed 64% of cases with moderate anemia, 44% with microcytic anemia, and 24% with hyperleucocytosis. Thrombocytopenia was present in twenty-eight per cent (28%) of cases and thrombocytosis in four per cent (4%) (n = 50).

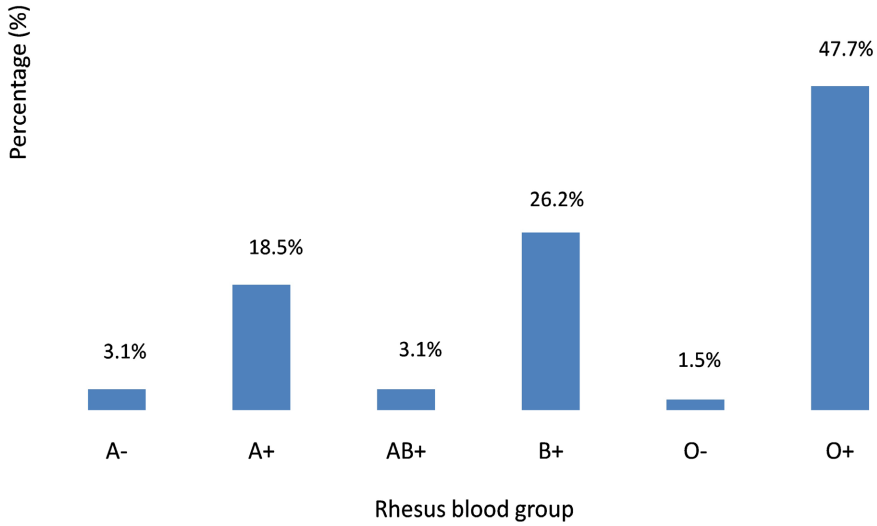

Figure 2. Distribution of patients by Rhesus blood group.

3.8. Some Therapeutic Aspects

3.8.1. Antibiotic Therapy and Antimalarial Treatment

Antibiotic therapy was administered to 40 out of 65 patients, or 61.5%. The most commonly used drug was ceftriaxone, administered to 34 out of 40 patients (75%), followed by amoxicillin + clavulanic acid in 11 out of 40 patients (27.5%). Metronidazole was administered to 7 out of 40 patients (17.5%). Other antibiotics such as azithromycin, ciprofloxacin and gentamicin were each administered to fewer than 3 patients. All patients who had presented with a malaria-like infectious complication received antimalarial treatment based on injectable artesunate. Treatments were tailored to each patient's clinical condition and to the protocols in effect in the department during the study period.

3.8.2. Analgesics and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)

NSAIDs were administered to 19 out of 65 patients, or 29.2%.

The distribution of patients according to the level of analgesic administered is shown in **Figure 3**.

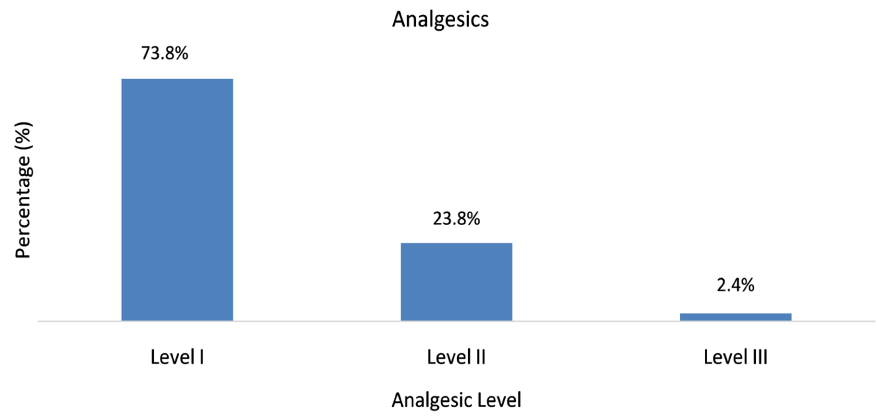

Figure 3. Breakdown of patients by level of analgesia administered (n = 42).

3.8.3. Blood Transfusion

Twenty-one out of sixty-five (21/65) patients, or 32.3%, had received a blood transfusion. In addition to packed red blood cells (PRBs), 1 in 21 patients had received a transfusion of fresh frozen plasma (7 units). Transfusion therapy was tailored to each patient's clinical condition and to the protocols in effect in the department during the study period.

The distribution of patients according to the number of packed red blood cells transfused is shown in Table 6.

Table 6. Distribution of patients according to blood transfusion data (n = 21).

Number of red blood cell concentrate units	Frequency	%
1	6	28.6
2	8	38.1
3	4	19
4	3	14.3
Total	**21**	**100**

Transfusions were justified in most cases by obstetric causes (postpartum hemorrhage) and acute complications of sickle cell disease.

3.8.4. Prevention of Thromboembolic and Venous Diseases

Prevention of VTE was carried out in 47.7% of cases (n = 65).

3.9. Prognostic Factors

❖ **Proportion of women who died during the study period** (n = 65)

In our study, 6 maternal deaths occurred among the 65 women included, corresponding to a case-fatality proportion of 9.2%. One death occurred during pregnancy (1.5%), while five deaths occurred during the postpartum period (7.7%).

❖ Length of hospital stay

The average length of hospital stays based on the data available was 4 ± 3 days, ranging from 1 to 17 days.

The distribution of patients according to length of hospital stay is shown in Table 7.

Table 7. Distribution of patients according to length of hospital stay (n = 50).

Length of hospital stay in days	Frequency	%
<7	44	88
7 - <10	4	8
≥10	2	4
Total	**50**	**100**

3.10. Newborn Data, Pregnancy Outcome and Prognosis

The mean Apgar score at one minute was 8.2 ± 1.1, with a range of 4 to 10. At five

minutes, it was 9.2 ± 1.1, with a range of 4 to 10, and at ten minutes, it was 9.6 ± 1, with a range of 4 to 10.

Pregnancy outcomes were assessed in the 65 patients included in the study. The pregnancies resulted in various obstetric outcomes, including miscarriage, stillbirth, ongoing pregnancy (17/65) or normally progressed until delivery on live newborns (48/65). Analysis of neonatal anthropometric parameters was performed only on live newborns from the normally progressed pregnancy.

The distribution of patients according to their Apgar scores at one minute, five minutes and ten minutes is shown in Table 8.

Table 8. Distribution of patients according to their Apgar scores (n = 48).

Apgar score	Frequency	%
Apgar score at 1 minute		
Apparent death ≤ 3	0	0
Resuscitation 4 - <7	2	4.2
Normal ≥ 7	46	95.8
Apgar score at 5 minutes		
Apparent death ≤ 3	0	0
Resuscitation 4 - <7	0	0
Normal ≥ 7	48	100
Apgar score at 10 minutes		
Appearance of death ≤3	0	0
Resuscitation 4 - <7	0	0
Normal ≥ 7	48	100
Total	**48**	**100**

Apart from the condition of two newborns who required resuscitation immediately after birth, there were no other issues.

The distribution of patients according to pregnancy outcome is shown in Figure 4.

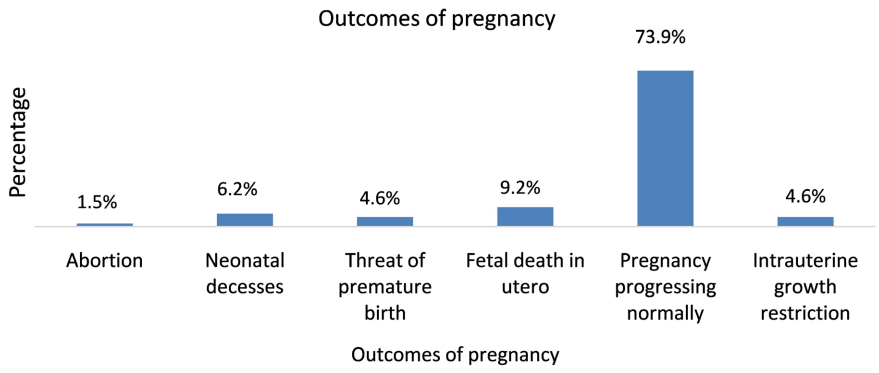

Figure 4. Breakdown of patients by pregnancy outcome.

❖ History of Deceased children among patients before the current pregnancy. (n = 65)

The distribution of patients according to the number of deceased children is shown in Table 9.

Table 9. Distribution of patients according to the number of deceased children (n = 65).

Number of deceased children	Frequency	%
0	51	78.5
1	12	18.5
2	2	3
Total	**65**	**100**

3.11. Factors Associated with Maternal Death

Associations between maternal death and certain clinical and obstetric complications were assessed using exploratory univariate analyses. Measures of association were reported with their 95% confidence intervals, and the χ^2 test or Fisher's exact test was used depending on the expected sample sizes. These results should be interpreted as exploratory associations and do not establish a causal relationship between the reported complications and maternal death.

The distribution of patients according to the association factors with the occurrence of maternal death is presented in Table 10.

Table 10. Distribution of patients according to the association factors with the occurrence of maternal death.

Variables	Frequency	Deceased n (%)	Alive n (%)	P
Postpartum anemia				
Yes	25	5 (20)	20 (80)	**0.027**
No	40	1(2.5)	39 (97.5)	
Postpartum hemorrhage				
Yes	4	3 (75)	1(25)	**0.001**
No	61	3(4.9)	58 (95.1)	
Postpartum infection				
Yes	7	3 (42.9)	4 (57.1)	**0.013**
No	58	3 (5.2)	55 (94.8)	
Hb phenotype				
HbSC	58	6 (10.3)	52 (89.7)	**0.048**
HbSS	7	0 (0.0)	7(100)	

In the univariate analysis, there was a statistically significant association between anemia (p = 0.027), hemorrhage (p = 0.001), infections (p = 0.013), hemoglobin phenotype (p = 0.048) and occurrence of the death in the postpartum.

4. Comments and Discussion

4.1. Prevalence and Sociodemographic Characteristics

The prevalence of major sickle cell disease (HbSC and HbSS genotypes) among pregnant women in our study was 0.67% at the Obstetrics and Gynecology Department of Bogodogo University Teaching Hospital (CHU-B). This finding is almost comparable to that reported by Barfield *et al.* [10] who found a prevalence of 0.6% among the pregnant women of African descent in Massachusetts.

These findings suggest that pregnancy among women with sickle cell disease is increasingly common, likely reflecting improved survival rates resulting from advances in the diagnosis and management of the disease. As a consequence, a growing number of women with sickle cell disease are reaching reproductive age and becoming pregnant.

The mean age of the pregnant women with sickle cell disease included in our study was 25.6 ± 5.7 years. This result is similar to that reported by Tsiba *et al.* [11] in Congo-Brazzaville, who found a mean age of 25 years among 22 pregnant women with sickle cell disease. Comparable findings were also reported by Sayambaye A. [12] in Burkina Faso, Badiaga Y. [4] in Mali, and Moussaoui *et al.* [13] in Gabon, who reported mean ages of 28 years, 27 ± 4 years, and 24 years, respectively. These findings may be explained by the fact that this age group corresponds to the period of highest fertility and reproductive activity in our socio-cultural context.

Most of the women included in our study had a low educational level. Only 10.8% had attained higher education, while 33.8% had completed secondary education, 23.1% had completed primary education, and 32.3% had received no formal education. The high proportion of women with little or no formal education may constitute a barrier to understanding the disease, adhering to medical recommendations, and effectively managing pregnancy-related complications.

In contrast to the study by Moussaoui *et al.* [13] in Gabon, where all participants were residents of Libreville, 70.8% of the women in our study originated from urban areas, whereas 29.2% came from rural areas. This difference may be explained by the hierarchical organization of the healthcare system in Burkina Faso, whereby patients requiring specialized care are referred from lower-level facilities to tertiary hospitals. Since our study was conducted in a university hospital, referrals from rural areas are expected, which explains the inclusion of pregnant women with sickle cell disease from both urban and rural settings.

4.2. Obstetric History

Most of the women included in our study were paucigravidas (69.2%). Our findings differs from those of Tsiba *et al.* [11], who reported that the majority of their patients were primigravidas (16 out of 22 women, or 72.7%). The observed difference may be related to variations in the reproductive characteristics of the study populations, including age at first pregnancy.

In our study, nulliparous women accounted for 10.7% of the pregnant women. This finding is lower than 41.9% reported by Ribeil *et al.* [14]. Differences ob-

served between Burkina Faso and other settings may be explained by the predominance of the HbSC genotype in Burkina Faso, which is generally associated with a milder clinical course than the HbSS genotype and may therefore allow women to achieve higher parity.

Seven of the 65 women included in the study had a history of at least one spontaneous abortion, representing 10.7% of cases. This result is almost comparable to that reported by Badiaga Y. [4] in Mali, who found a history of abortion in 7 of 45 patients (15.5%).

Our results were higher than those reported by Ogedengbe and Akinyanju [15] in Nigeria, who observed an abortion rate of 3.2% in their study. This difference could be explained by the fact that in our study rate corresponded to the proportion of women who reported a history of at least one spontaneous abortion in their lifetime, whereas the study by Ogedengbe and Akinyanju reported only abortions that occurred during the study period among the women they were specifically following.

4.3. Acute Complications of Sickle Cell Disease

Anemia, vaso-occlusive crises (VOCs), and infections were the most frequent complications observed during pregnancy in our study, affecting 72.3%, 72.3%, and 32.3% of patients, respectively. Acute chest syndrome was diagnosed in 9.2% of cases.

Regarding vaso-occlusive crises, our findings are comparable to those reported by Badiaga Y. [4] in Mali, who found a prevalence of 62%. Similarly, Leborgne *et al.* [6] in Guadeloupe reported that 88% of pregnant women with sickle cell disease experienced at least one vaso-occlusive crisis during pregnancy. These findings highlight the fact that pregnancy is a period associated with an increased frequency of sickle cell-related complications, particularly vaso-occlusive events, owing to the physiological changes that occur during gestation.

Our results differ from those reported by Tsiba *et al.* [11], who observed vaso-occlusive crises in 45.4% of cases during pregnancy. This variation may be attributable to differences in patient characteristics and disease severity.

As during pregnancy, anemia, vaso-occlusive crises, and infections remained the most common complications during the postpartum period, although at substantially lower frequencies, affecting 38.4%, 24.6%, and 10.7% of patients, respectively. The reduction in the frequency of these complications after delivery may be explained by the resolution of pregnancy-related physiological stressors that can exacerbate the manifestations of sickle cell disease.

4.4. Laboratory Data

In our study, patients with the HbSC genotype constituted the majority of the study population (89.2%), whereas those with the HbSS genotype accounted for 10.8%. Similarly, Badiaga Y. [4] reported a predominance of HbSC patients, who represented approximately 51.1% of his study population.

Our findings differ from those of Leborgne et al. [6] in Guadeloupe, who reported among 68 pregnant women with sickle cell disease, 33 cases (48,5%) of HbSS, 30 cases (44,1%) of HbSC, 3 (4,4%) cases of HbS/β^+-thalassemia, and 2 (3%) cases of HbS/β^0-thalassemia. This difference may be related to variations in the genetic background of the populations studied. It can also be due to the distribution of sickle cell genotypes in the respective geographical settings.

The mean hemoglobin level in our study was 8.9 g/dL. This value is slightly lower than that reported by Badiaga Y. [4], who found a mean hemoglobin level of 9.5 g/dL. This difference may be explained by variations in disease severity, genotype distribution, and management practices between the two study populations. In particular, the absence of a routine transfusion program in our setting may have contributed to the lower mean hemoglobin level observed in our patients.

4.5. Therapeutic Aspects

Among the 48 women who delivered during the study period 19 (39.6%) had a vaginal delivery, while 29 (60.4%) underwent cesarean section.

Our cesarean section rate was higher than that reported by Nayama M. [16] in Niger, who observed 19 vaginal deliveries (76%) and 6 cesarean sections (24%) among 25 women in labor. This difference may be explained by variations in obstetric management protocols, patient characteristics, disease severity, and the occurrence of maternal or fetal complications requiring surgical delivery.

A total of 32.3% of patients received blood transfusions during pregnancy and/or the postpartum period. This finding is comparable to that reported by Leborgne S.Y. *et al.* [6], who found a transfusion rate of 36.7% during pregnancy and/or the postpartum period.

The relatively high frequency of blood transfusion may be explained by the worsening of anemia during pregnancy, increased hematologic demands associated with gestation, acute sickle cell-related complications, and blood loss occurring during delivery. Furthermore, transfusion therapy remains an important component of the management of severe anemia and certain maternal complications in pregnant women with sickle cell disease.

4.6. Data on the Fetus and the Newborn

In our study, the rate of intrauterine fetal death (IUFD) was 9.23%. This finding is similar to that reported by Tsiba *et al.* [11], who observed 2 cases of IUFD among 22 pregnancies (9%) in their series. This similarity may reflect the increased risk of adverse fetal outcomes associated with sickle cell disease during pregnancy.

The rate of intrauterine growth restriction (IUGR) in our study was 4.6%. This finding differs from that of Tsiba *et al.* [11], who reported 3 cases of IUGR among 22 pregnancies (13.6%). This discrepancy may be related to differences in the frequency and severity of maternal complications between the two studies.

Among the 48 newborns included in our study, 43 (89.58%) had a normal birth weight, while 5 (10.42) had a low birth weight. Low birth weight was observed among newborns whose mothers had experienced at least one sickle cell crisis during pregnancy. This finding could be explained by the potential impact of vaso-occlusive crises on uteroplacental blood flow and oxygen supply to the fetus. That can thereby increase the risk of intrauterine growth restriction and low birth weight.

The mean birth weight in our study was 2700 ± 418 g. This result is comparable to that reported by Abudu O. *et al.* [17] in Nigeria, who found a mean birth weight of 2580 ± 150 g among 35 newborns born to women with sickle cell disease. This result could be explained by the fact that the increased risk of fetal growth restriction associated with sickle cell disease, do not systematically occur in all pregnancies. The quality of prenatal care and the management of maternal complications can contribute to maintain satisfactory fetal growth in the majority of newborns.

4.7. Study of Factors Associated with the Proportion of Women Who Died during the Study Period

The proportion of women who died during the study period was higher during the postpartum period (5 of 6 deaths) than during pregnancy (1 of 6 deaths), corresponding to a proportion of women who died during the study period of 9.2%. Leborgne-Samuel *et al.* [6] reported 1 maternal death among 68 pregnancies (1.4%) in Guadeloupe.

The proportion of women who died during the study period observed was therefore considerably higher than that reported by Leborgne-Samuel *et al.* This finding highlights the need to strengthen preventive and therapeutic measures aimed at improving the survival of pregnant women with sickle cell disease in our setting.

Analysis of the associations between the study variables showed statistically significant relationships between postpartum hemorrhage, postpartum infections, anemia, the SC hemoglobin phenotype, and the proportion of women who died during the study period. In our series, postpartum hemorrhage, infections, and anemia were major contributors to maternal death. These findings underscore the importance of multidisciplinary management and early specialized obstetric care for pregnant women with sickle cell disease.

The association observed with the HbSC phenotype may be explained by the predominance of this genotype in our study population, which accounted for 89.2% of cases.

5. Conclusions

This cross-sectional retrospective study investigated the epidemiological and prognostic aspects of pregnancy in women with major sickle cell disease (HbSC and HbSS phenotypes), and provided an overview of the current situation at the Obstetrics and Gynecology Department of Bogodogo University Teaching Hospi-

tal(CHU-B).

Major sickle cell disease during pregnancy remains a frequent and serious condition because of its high maternal and perinatal morbidity and the proportion of women who died during the study period. Pregnancy-related complications, mainly anemia, vaso-occlusive crises, infections, and acute chest syndrome, contribute significantly to adverse maternal and fetal outcomes.

These findings highlight the urgent need for larger prospective analytical studies to better identify associated factors of complications in order to improve the management and prognosis of pregnant women with sickle cell disease and their newborns.

Author Contributions

Dr. Hamado Sawadogo contributed to data collection, data analysis, and manuscript drafting. Adjaratou Fabienne Sanou contributed to the methodology, critical review, and revision of the manuscript. Adama Ouattara participated in the conceptualization of the study, the development of the methodology, and software-related aspects. Charlemagne Marie Ouédraogo contributed to the methodology, review of the manuscript, and validation of the document. All authors have read and approved the final version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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