Sickle cell disease: Maternal and neonatal prognosis during gravido-puerperality at the departmental university teaching hospital of borgou.

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Abstract

Introduction: Pregnant women with sickle cell disease have a high risk of morbidity and mortality.

Objective: This study sought to investigate the maternal and neonatal prognosis of sickle cell disease from 2017 to 2021 at the Departmental University teaching Hospital of Borgou (CHUD/B).

Method: This was a retrospective cross-sectional study with descriptive and analytical purposes, carried out in the mother-child department and intensive care unit of the Departmental University teaching Hospital of Borgou (CHUD/B). Data collection was carried out from February 5, 2022 to June 5, 2022. A non-probability sampling technique with exhaustive recruitment of participants meeting the inclusion criteria was used. Pearson's Khi2 or Fisher's exact tests were used accordingly.

Result: A total of 128 medical records of sickle cell pregnant women were reviewed with 97 (75.8%) SC type and 31 (24.2%) SS type. The hospital frequency of sickle cell disease was 0.99%. The most frequent childbirth route in these women was caesarean section (90.6%) of which 72.16% was prophylactic with the sole indication of sickle cell disease. The main complications found following childbirth were severe anemia (66.7%), vaso-occlusive crisis (29.6%), and puerperal infection (25.8%). Maternal mortality related to sickle cell disease was 11.72% while neonatal mortality was 8.1%. In addition, SS sickle cell patients were more likely to be anemic (p=0.0320), to be transfused (p=0.0086) and to give birth to a baby deceased in utero (p=0.016) than SC sickle cell patients. The fetal prognosis is twice as bad in SS sickle cell women than in SC women (p=0.049).

Conclusion: Pregnancy on sickle cell disease is associated with multiple prenatal and postnatal complications at the CHUD-B. SS women are more likely to have more complications than SC women.

Keywords: Sickle Cell Disease, Prognosis, Pregnant Women, CHUD/B.

Introduction

Sickle cell disease is a worldest life-threatening genetic disease [1]. It is a hereditary disease related to the loss of flexibility and deformability of red blood cells and affects several countries (156 countries on five continents) [2]. The incidence of pregnancy with sickle cell disease varies between 0.14 - 0.29% depending on the region [3]. Pregnant women with sickle cell disease have a high risk of morbidity and mortality [4].

Pregnant women with sickle cell disease were erstwhile considered at high risk of complication because of unfavorable socio-economic conditions, prolonged hospitalizations, etc. Nowadays, with the life expectancy improvement, possibility of early diagnosis, availability of adequate and early multidisciplinary management, the association of sickle cell disease and pregnancy has become non-frightening, even in vulnerable settings.

However, these women remain more likely prone to clinical and obstetric complications than in the general population [5].

In Benin, there is a scarcity of study coming back to this theme which is still topical. Studies reporting statistics on pregnancy among sickle cell women are almost non-existent, particularly in the municipality of Parakou, and the genotype

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associated with complications remains little known. All these reasons motivated the performance of this work which sought to investigate the maternal and neonatal prognosis of sickle cell disease from 2017 to 2021 at the Departmental University teaching Hospital of Borgou (CHUD/B).

Method

This was a retrospective cross-sectional study with descriptive and analytical purposes, carried out in the mother-child department and intensive care unit of the Departmental University teaching Hospital of Borgou (CHUD/B). Data collection was carried out from February 5, 2022 to June 5, 2022. The source population was made of all the pregnant women admitted into the CHUD/B maternity ward during the study period. The target population was made of all major sickle cell pregnant women admitted into the CHUD/B maternity ward during the study period. Women diagnosed with major sickle cell disease at the CHUD/B from January 1, 2017 to December 31, 2021 were included in the study. The newborns of these women diagnosed with major sickle cell disease were also included. Women and newborns whose medical records were unusable were excluded from this study. In addition, women with minor sickle cell disease (AS and AC types) as well as women without sickle cell traits (AA type) were not included in this study. It was the same for the newborns of the latter. The diagnosis of sickle cell disease was made based on hemoglobin electrophoresis.

A non-probability sampling technique with exhaustive recruitment of participants meeting the inclusion criteria was used. Thus, medical records of women and newborns eligible were considered. Medical records' manual analysis technique was used for data collection. Data was collected using a survey form. A pre-test was carried out over two days on ten randomly selected medical records and the survey form was improved. The collection was initially carried out in the maternity ward. The admission register of the maternity ward was used to identify the registration number of the women included in this study. Then it was identified the women were sent into the intensive care unit for further care. The same process was used for newborns who were transferred to neonatology. Data was also collected in these two different sections. The survey sheet was validated by checking the completeness and consistency of the data collected.

The dependent variable was the type of sickle cell disease (SS or SC). The co-variables were related to Socio-demographic data, Clinical data, Background, Pregnancy data, Diagnosis and Treatment Aspects, and Prognosis aspects.

Data entry was performed using EPIDATA software version 3.1 Fr, and data analysis was implemented using IBM SPSS Statistics 21 software. Pearson's Khi2 or Fisher's exact tests were used accordingly to determine association between variables. The significance level of 5% was considered.

This research's proposal received approval from the Local Ethics Committee for Biomedical Research (CLERB) of Parakou University. Administrative approval was obtained from the Director of the CHUD/B and the Heads of the departments above mentioned. The need for informed consent was waived due to the retrospective nature of the study.

Result

Hospital frequency of sickle cell disease in pregnancy

A total of 137 sickle cell patients were identified for 13,729 admissions; i.e a hospital frequency of sickle cell disease of 0.99%. No thalassemia was identified. Among the 137 sickle cell patients identified, 9 were excluded from the study. More than two thirds of the patients had SC type (75.8%), while SS type made up 24.2% of the sample.

Sample description

The mean age of the participants was 25.40 ± 4.52 years with a range of 17 and 38 years. Patients aged 20 to 30 were the most represented (73.4%). Coming mostly from an urban area (71.9%), they were craftswomen (40.6%) and married (67.2%). [Table 1].

Clinical data

The patients received (50%) at the CHUD/B were referred from peripheral settings. The Integrated Medical Care Center

Table 1: Distribution of participants according to age, area of provenance, occupation and marital status (n=137)

Age (Years)	Size	Percentage (%)
<20	11	8.6
20 – 30	94	73.4
≥30	23	18
Area of provenance		
Urban	92	71.9
Rural	36	28.1
Occupation		
Craftswoman	52	40.6
Student, apprentice	31	24.2
Householdwife	26	20.3
Civil servant	19	14.8
Marital status		
Married	86	67.2
Cohabiting	35	27.3
Single	6	4.7
Widowed	1	0.8

for Infants and Pregnant Women with Sickle Cell Disease (CPM-NFED) referred 51.6% of them. The other peripheral settings were the zone hospital of Parakou-N'dali (28.1%), the private clinics (10.9%) and the peripheral maternities (9.4%). The reasons for reference were planned caesarean section (32.8%), Preterm labour / Threatened preterm delivery (25%), vaso-occlusive crisis (21.9%), anemia (10.9 %) and pulmonary infection (4.7%). Treatment before referral was dominated by the administration of analgesics (17.2%) and antibiotics (14.1%). Some patients (34.4%) had received no treatment before referral.

Background

At the CHUD/B, it was found that 11.7% of women with sickle cell disease did not know their electrophoretic status before their admission to the maternity ward. Moreover, 2.3% of women had high blood pressure associated with their clinical picture and 2.3% diabetes. Surgical history was dominated by caesarean section (34.4%), myomectomy (0.8%), ectopic pregnancy (0.8%) and surgery for necrosis of the femoral head (0.8%). %). Regarding the obstetric history, primiparous represented 50% of the sample. They were followed by pauciparous (21.9%) and multiparous (21.9%). The nulliparous for their part exceeded more than half of the sample (54.7%). Primiparous, pauciparous and multiparous were respectively represented in 21.9%, 11.7% and 10.9%.

Pregnancy data

More than half of the participants had made more than 4 prenatal checkups (54.7%). Those who did not make any prenatal checkup were 10.9%. The general condition of the participants was preserved in 84.4% when admitted into the maternity ward. Palpebral mucous and integuments were well stained in 76.6% of cases. More than 2/3 of the participants had normal temperature (78.2%), normal blood pressure (86.7%), normal heart rate (84.4%), and normal respiratory rate (82%). Jaundice was noted in 6.3% of cases. About 93% of participants had carried out blood tests. Anemic patients with a hemoglobin level lower than 10g/dl were 81.5% and among them 34.3% had a hemoglobin level lower than 7g/dl. Blood ionogram (Natremia, kalaemia and chloremia) was normal in less than half of the participants. Uricemia, uremia and creatinaemia were normal in respectively 16.8%, 15.1%, and 21.8% [Table 2].

Diagnosis and Treatment Aspects

The pathologies most diagnosed among our participants were: severe anemia (32%), Threatened preterm delivery /premature rupture of membranes (32%), vaso-occlusive crisis/acute chest syndrome (29.7%), malaria (15.6%), high blood pressure and pregnancy (11.7%), respiratory infection/urinary tract infection (5.4%) and fetal death in utero (3.1%). Ongoing pregnancies without associated pathology represented 35.9% of the sample.

Regarding the medical treatment, more than 2/3 of the patients had received antibiotics (90.6%) and analgesics (89.8%). The other treatments received were: oral anti-anaemics (43%), hyperhydration (31.3%), blood transfusion (26.6%), oxygen therapy (21.1%) and antihypertensives (13 .3%). Lung maturation was indicated in 3.1% of cases. Furthermore, no woman was seen by a hematologist at CHUD/B throughout the pregnancy. During treatment, transfer to the intensive care unit was essential for 34% of the participants, but 27.3% of them could not be transferred because of a lack of space in the intensive care unit. They were kept in the maternity ward and instructions were received from the intensive care physicians about their treatment.

The main delivery route noticed among the participants was caesarean section (90.6%) of which 72.16% was prophylactic with the only indication of being diagnosed with sickle cell disease. The other emergency caesarean sections (9.4%) were indicated for: eclampsia/pre-eclampsia (37.03%), vaso-occlusive crisis (25.92%), fetal distress (22.2%), labour and surgical pelvis (11.11%), and maternal rescue for retro-placental hematoma (7.4%). The deliveries took place before 37 SA in 41.4% and between 37 SA and 40SA in 42.8% of cases.

The newborns (108) had a mean weight of 2589.65g ± 476.49g with a range of 1100g and 3700g. The mean height reported was 46.54 cm ± 3.03 cm. The mean head circumference was 34 cm. The mean thoracic circumference of these newborns was 31.02 cm ± 3.00 cm. At the first minute, the mean APGAR score was 8.57 ± 1.14. At the fifth and tenth minute the mean APGAR score was 9.64 ± 0.89 and 9.82 ± 0.61 respectively. Transfer to neonatology was carried out for 74 newborns, ie 71.8% of them, for a mean hospital stay of 3.49 days ± 2.46 days. Post-caesarean monitoring (50%), prematurity (24.3%) and low birth weight (12.2%) were the most common reasons for transferring newborns to neonatology.

The main pathologies diagnosed among the newborns in neonatology were: prematurity (43.2%) including 32.4% slight prematurity, neonatal infections (28.4%), growth retardation (13.5%), perinatal asphyxia (5, 4%), respiratory distress (5.4%) and congenital malaria (1.4%). In contrast, 25.7% of newborns transferred to the neonatology section were declared apparently healthy.

Table 2*:* Distribution of participants according to Blood Ionogram, Kidney Function Assessment tests and Uricemia (n=137)

	Low	Normal	High	Not done
Natraemia	27 (22.7%)	41 (34.5%)	1 (0.8%)	50 (42%)
Kalaemia	17 (14.3%)	52 (43.7%)	-	50 (42%)
Chloraemia	-	37 (31.1%)	31 (26.1%)	50 (42%)
Uricaemia	7(5.9%)	20(16.8%)	12(10.1%)	80 (67.2%)
Uraemia	35(29.4%)	18(15.1%)	-	66 (55.5%)
Creatinemia	25(21%)	26 (21.8%)	3 (2.5%)	65 (54.6%)

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Table 3: Correlations between the type of sickle cell disease and the covariables (n=137).

	Type of sickle cell disease				N	PR	95% CI	*p-value*
	SC		SS					
	n	%	n	%				
Anemia								
Yes	25	64.1	14	35.9	39	**0.41**	0.34 – 0.90	*0.032*
No	72	80.9	17	19.1	89	1	---	---
Blood transfusion								
Yes	20	58.8	14	41.2	34	**1.38**	1.02 - 1.86	*0.0086*
No	75	81.5	17	18.5	92	1	---	---
Fetal death in utero								
Yes	3	75	1	25	4	**0.32**	0.05 - 1.76	*0.016*
No	96	22.6	28	77.4	124	1	---	---
Maternal prognosis								
Good	86	76.8	26	23.2	112	1	0.79-1.57	*0.483*
Bad	11	68.8	5	31.3	16			
Fetal prognosis								
Bad	11	57.9	8	42.1	19	**1.99**	1.05 – 3.78	0.049
Good	86	78.9	21	21.6	109	1	---	---

Prognosis aspects

Postpartum was beset by complications, the main ones being severe anemia (66.7%), vaso-occlusive crises (29.6%), and puerperal infections (25.8%). Postpartum eclampsia was noticed in 11.1% of cases. Other complications such as thrombophlebitis, ionic disorders, acute pulmonary oedema, pyelonephritis and hepatic encephalopathy were also noticed in a proportion of 3.7% each of them. The duration of hospital stay of the participants was 6 days ± 1.2 days in the absence of complications and 9.23 days ± 2.45 days when complications occurred.

Favorable progression was noted in 75.7% among patients discharged. On the other hand, there were 15 maternal deaths, 7 deaths in the prenatal period and 8 in the postnatal period; Then the maternal mortality rate was 11.72%. The causes of death in the prenatal period were: acute chest syndrome (2.34%), hypertension (1.57%), severe anemia (0.78%), and acute coronary syndrome (0.78 %). Those of the postnatal period listed were: severe anemia (2.34%), acute chest syndrome (1.57%), disseminated intravascular coagulation (0.78%), hypertension (0.78%), and sepsis (0.78%).

Newborns meanwhile were in 79.7% were formally discharged against 8.1% discharged against medical advice. Neonatal death was recorded in 8.1% with cause of acute respiratory distress (5.4%), sepsis (2.7%).

SS sickle cell patients were more likely to be anemic than SC sickle cell patients. The risk of blood transfusion was 1.38 times higher in SS sickle cell patients than SC patients. There is a statistically significant difference between SS and SC sickle cell patients with regard to the occurrence of death in utero (p=0.016). Indeed, there had been more deaths in utero in SC women than in SS women. But the number 1 being included at the level of the confidence interval, we cannot be sure on the fact that SC sickle cell patients are more likely to have more death in utero. Moreover, in terms of maternal prognosis, there is no significant difference between the two groups of women. The fetal prognosis, on the other hand, is twice as bad in SS sickle cell patients as in SC sickle cell patients [Table 3].

Discussion

The frequency of sickle cell disease among pregnant women varies from region to region [6]. At the CHUD/B, it was 0.99%. In Cameroon, 0.1 women with sickle cell disease were reported per 100 deliveries [7] and in Togo 0.8 per 100 deliveries [8]. These data describe a fraction of people living with sickle cell disease in our settings. We must work through awareness raising to achieve much lower rates of sickle cell disease in Benin and in Africa.

Regarding the sickle cell disease type, the SC type (75.8%) predominated the SS type (24.2%) at the CHUD/B. This finding is consistent with those found by Adama-Hondegla et al. [8] at the Clinic of Gynecology and Obstetrics of the CHU Sylvanus Olympio in Lomé: 77% of the SC type against 23% of SS type. This high rate of SC type confirms the hypothesis that very few patients with SS type generally reach childbearing age. A cohort study taking into account the two types of sickle cell disease from childhood to adulthood could make it possible to dispel the doubt around the question.

There is no consensus regarding the delivery route that should be preferred for women with sickle cell disease. Some authors encourage the use of the vaginal route but under epidural anesthesia in order to relieve the pain of delivery [9]. But the risk of caesarean section is higher in this group of patients than in the general population. In Congo, 63.6% of women with sickle cell disease gave birth by caesarean section [10]. This is also the case at CHUD/B; the main delivery route for women with sickle cell disease was caesarean section (90.6%) of which 72.16% was prophylactic. Since the 1990s, the gynecology and obstetrics department's protocol had required a systematic cesarean section at 36 weeks of amenorrhea in women with sickle cell disease and this was related to the technical platform and the intensive care conditions. Today the

same protocol is still used although many advances have been made both in the field of human capital and in resuscitation and monitoring equipment. In-depth studies should be carried out in order to identify the group of women with sickle cell disease who should benefit from a systematic caesarean section. Certain preventive measures such as warming, oxygenation and optimal hydration of the parturient, or even early epidural locoregional analgesia, have been evidenced in other countries in terms of vaginal delivery [11]; They should be studied and adapted to our realities.

The main complications found in decreasing order in our study were severe anemia, vaso-occlusive crises, and puerperal infections. According to several Western and African literatures, the main postpartum complications were severe anemia, vaso-occlusive crises, pre-eclampsia, acute thoracic syndrome (ATS) and postpartum hemorrhage [12-14]. Tothis must be added maternal death, which is 5.98 times higher than in the general population [15]. In the present study, the maternal mortality rate is 11.72% [12] had reported 3.2% of maternal deaths related to sickle cell disease. However, several authors have reported not having had any maternal deaths in their study [10,16]. Actually, there is a statistically significant difference between the number of prenatal checkups and the occurrence of postpartum complications [12]. Those who followed their pregnancy well had fewer complications than those who followed their pregnancy badly or not at all. All this to draw attention to the importance of enhancing close follow-up of pregnancies in sickle cell patients. The main cause of maternal death of women with sickle cell disease in our study was acute chest syndrome (3.91%) [17] also reported that four out of five deaths were attributable to acute chest syndrome in women with sickle cell disease [18] also evidenced the same findings regarding the causes of death of women with sickle cell disease. We deduce that the acute chest syndrome is a serious complication and the first cause of death in sickle cell disease. It should be suspected in sickle cell disease presenting with chest pain, fever and/or hypoxemia [19]. Health workers caring for patients with sickle cell disease must be on the front lines and not trivialize any chest pain in these types of patients. Chest imaging is one of the key diagnostic tests. Broad-spectrum antibiotic therapy, covering atypical germs, and blood transfusion should be quickly considered [19]. Preventive treatment of acute chest syndrome using incentive spirometry is also essential when a patient is hospitalized for a vaso-occlusive bone crisis [20]. At the CHUD/B, we do not have an incentive spirometer to prevent this complication. However, this simple, inexpensive and non-invasive technique has been evidenced to significantly reduce the risk of acute chest syndrome [20].

The newborn, meanwhile, pays a heavy price in the event of sickle cell disease. It is associated with a higher risk of intrauterine growth retardation, low birth weight and perinatal mortality in both low-income and high-income countries [21]. Poor intrauterine growth is an indicator of placental insufficiency. In women with sickle cell disease, it may be due to vascular occlusion and endothelial damage among many other factors.

Comparing SS and SC genotypes, this study revealed that SS sickle cell mothers are more likely to benefit from blood transfusions, and the prognosis of their fetuses and newborns is poorer than that of fetuses and newborns of SC sickle cell mothers. Several authors agree that episodes of vaso-occlusive crises, antepartum and postpartum transfusions, and a higher percentage of premature deliveries were more frequent in SS women than in SC women [8, 16,18].With regard to maternal mortality, we found no statistically significant difference between the two groups of patients (SS and SC). The literature reports the same results: acute chest syndrome was not associated with either type of sickle cell disease, and maternal mortality rates between SS and SC type were not significant [8, 18].

Conclusion

Pregnancy on sickle cell disease is associated with multiple prenatal and postnatal complications at the CHUD-B. Maternal mortality related to sickle cell disease is still high in our settings. SS types are more likely to have more complications than SC types. Regardless of the type, adequate preconception, prenatal and postnatal cares by a multidisciplinary team should improve the outcome of pregnancy among these women at the CHUD-B.

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