Central African Journal of Public Health
2023; 9(6): 167-171
http://www.sciencepublishinggroup.com/j/cajph
doi: 10.11648/j.cajph.20230906.12
ISSN: 2575-5773 (Print); ISSN: 2575-5781 (Online)

Maternal-Fetal Prognosis of Pregnancy and Childbirth in Sickle-Cell Patients at the Bernard Kouchner Community Medical Centre of Coronthie in Conakry (Guinea)

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To cite this article:

Tolno Tamba Julien, Leno Daniel William Athanase, Balde Maimouna, Toure Souleymane, Camara Moussa et al. (2023). Maternal-Fetal Prognosis of Pregnancy and Childbirth in Sickle-Cell Patients at the Bernard Kouchner Community Medical Centre of Coronthie in Conakry (Guinea). *Central African Journal of Public Health*, *9*(6), 167-171. https://doi.org/10.11648/j.cajph.20230906.12

Received: October 3, 2023; **Accepted**: October 30, 2023; **Published**: December 11, 2023

Abstract: *Introduction*: Sickle cell anaemia is an autosomal recessive inherited haemoglobin disorder caused by the presence of high concentrations of abnormal haemoglobin, haemoglobin S, in the red blood cell. Pregnancy is not contraindicated in women with sickle cell disease, but it is a high-risk situation for both mother and foetus. Observed maternal mortality varies from 0.5 to 5%. The aim of this study was to describe the management and maternal-fetal prognosis of sickle cell disease during pregnancy and childbirth. *Patients and methods*: This was a prospective longitudinal descriptive study conducted over 12 months (1 January to 31 December 2022) in the gynaecology-obstetrics department of the Bernard Kouchner community medical centre in Coronthie, Conakry (Guinea). Pregnant women were included following diagnostic confirmation of sickle cell disease by haemoglobin electrophoresis. *Results*: During the study period, 43 (8.1%) of the 533 pregnant women attending antenatal clinics met our inclusion criteria. The mean age was 27.83 years, with extremes of 16 and 40 years. Professional women were the most affected (41.8%). Primiparous women and women with no schooling represented 51.2% and 39.5% of our study population respectively. The medical and obstetric history was dominated by vaso-occlusive crises (46.5%), followed by anaemia (23.2%), miscarriage (11.6%), genital infections (6.9%) and foetal death in utero (4.7%). We noted three types of sickle cell phenotype with varying proportions: the AS phenotype (65%), the SC phenotype (23%) and the SS phenotype (12%). Complications were mainly anaemia (27.9%), vaso-occlusive crises (13.9%), retroplacental haematoma (6.9%), premature rupture of membranes (6.9%), urinary tract infection (4, 6%), hypertension (2.3%), acute foetal distress (11.6%), hypotrophy (4.7), intrapartum foetal death (4.7%), in-utero foetal death (2.3%) and intrauterine growth retardation (2.3%). *Conclusion*: Sickle cell disease in pregnant women is common in our context and often leads to maternal and perinatal complications. The Emmel test should be performed systematically at each first antenatal consultation, along with haemoglobin electrophoresis.

Keywords: Sickle Cell Disease, Pregnancy, Delivery, Maternal-Fetal Prognosis, Conakry

1. Introduction

Sickle cell anaemia is an autosomal recessive inherited haemoglobin disorder caused by the presence of high concentrations of abnormal haemoglobin, haemoglobin S, in the red blood cell [1]. It is the most common genetic disease in the world, occurring mainly in black people. It is therefore a real public health problem in Africa, where its prevalence varies from 10 to 40% of carriers of the gene, depending on

the region [1-3]. In Guinea, according to the 2018 demographic and health survey, 11.57% of the population are sickle cell carriers [4]. The frequency of the haemoglobin S allele is around 20% in some parts of Africa so, nowadays this problem is also becoming increasingly prevalent in Europe as a result of south-north population movements [5]. Sickle cell disease is a serious condition with high morbidity and mortality. Pregnancy is not contraindicated in women with sickle cell disease, but it is a high-risk situation for both mother and foetus. Observed maternal mortality varies from 0.5 to 5% [2, 6].

The aim of this study was to describe the management and maternal-fetal prognosis of sickle cell disease during pregnancy and childbirth at the Bernard Kouchner Community Medical Centre in Coronthie, Conakry (Guinea).

2. Material and Methods

This was a prospective longitudinal descriptive study lasting one year (from 1 January to 31 December 2022) on all pregnant women monitored in the department in whom the Emmel test (falciformation test) was performed initially and which enabled the red blood cells to be observed on smear. Secondly, haemoglobin S was detected by electrophoresis of haemoglobin at alkaline pH or isoelectric focusing (in homozygotes: 90 to 97% HbS and 3 to 10% HbF, and no HbA). The variables studied included the socio-demographic profile of pregnant women (age, profession, ethnicity, level of education), medical and obstetric history, the course of the pregnancy (maternal and foetal complications, treatment), delivery, maternal and foetal prognosis and the post-partum period.

Qualitative data were presented in terms of frequency or percentage, and quantitative data were evaluated as an average.

Verbal informed consent was obtained from participants, and confidentiality and anonymity in data processing were respected.

3. Results

During the study period, 43 out of 533 pregnant women attending antenatal clinics were positive for the Emmel test, a frequency of 8.07%. The 20-29 age group was the most represented (65.1%). The average age was 27.8%, with extremes of 16 and 40. Professional women were the most affected (41.9%). Married women were more numerous (90.7%). The Peulh ethnic group was the most affected (34.9%), followed by the Sousou and Malinké groups (30.2% each). Primiparous women accounted for 51.2% of our population and those not attending school for 39.5%. In the medical-obstetric history, we found a notion of vaso-occlusive crisis (46.5%) followed by anaemia (23.2%), miscarriage (11.6%), genital infection (6.9%) and foetal death in utero (4.7%). Figures 1 and 2 show the different phenotypes and haemoglobin levels respectively.

The drugs most frequently administered were folic acid (5mg x 2/day), tier 1 analgesic (paracetamol 1000mg: 1cp x2/d), antispasmodic (Spasfon: 2cp x 2/d.

During our study period, 51.2% of pregnant women gave birth at between 30 and 37 weeks' amenorrhoea (SA), 46.5% gave birth at over 37SA and 2.3% at between 22-29SA.

More than half of pregnant women gave birth by caesarean section (58.1%), compared with 41.9% by vaginal delivery.

At birth, 88.3% of newborns had an Apgar score ≥7 at 5 minutes and 11.7% had an Apgar score <7.

Birth weight was normal (2500 to 3999g) in women of AS phenotype 65% (28 cases), SC 23% (10 cases), SS12% (5 cases) while 4 cases of AS phenotype patients gave birth to newborns weighing less than 2500g.

Tables 1, 2 and 3 summarise the maternal ante-partum, post-partum and foetal prognoses respectively.

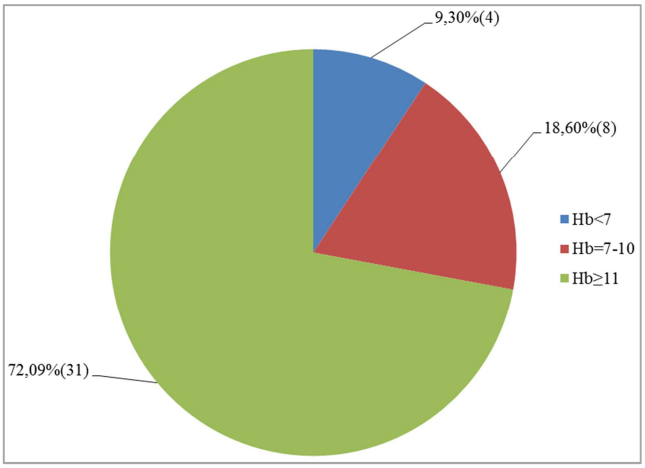

Figure 1. *Distribution of pregnant women with sickle cell disease according to haemoglobin level during pregnancy in g/dl.*

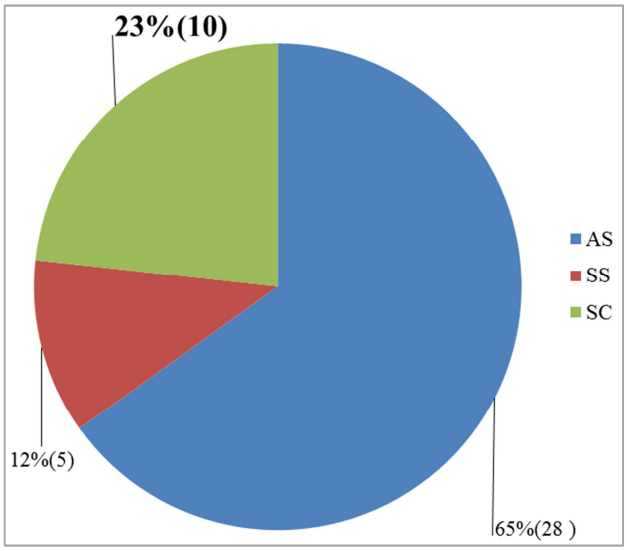

Figure 2. *Distribution of pregnant women with sickle cell disease according to haemoglobin type.*

Table 1. *Antepartum maternal prognosis.*

Characteristics	Number (N=43)	Percentage
No complications	16	37.20
Anaemia	12	27.90
Vaso-occlusive crisis	6	13.95
Retroplacental haematoma	3	6.97

Characteristics	Number (N=43)	Percentage
Premature rupture of membranes	3	6.97
Urinary tract infection	2	4.70
Arterial hypertension	1	2.32

Table 2. *Fetal prognosis.*

Characteristics	Number (N=43)	Percentage
Normal newborns	32	74.42
Acute foetal distress	5	11.62
Hypotrophy	2	4.65
Intrapartum death	2	4.65
Intrauterine growth retardation	1	2.32
Intrauterine foetal death	1	2.32

Table 3. *Post-partum maternal prognosis.*

Characteristics	Number (N=43)	Percentage
Favourable	35	81.39
Anaemia	4	9.30
Pelviperitonitis	1	2.32
Arterial hypertension	1	2.32
Vaso-occlusive crisis	1	2.32
Acute intestinal obstruction	1	2.32

Nb: one parturient alone had three complications: anemia, hypertension and vasoocclusive crisis

4. Discussion

In our study, we collected 43 Emmel-positive pregnant women in whom haemoglobin electrophoresis revealed the predominance of the AS phenotype.

This result is similar to the data from the study by Berzolla C et al [6]. The high cost of haemoglobin electrophoresis in our country considerably limits its use and justifies the small size of our sample.

The mean age observed in our study series was 27.83 years, with extremes of 16 and 40 years. The 20-29 age group was the most represented, with a frequency of 65.12%. Our results are similar to those of Ohiohin A. G et al and Tchente C. N et al, who respectively found a mean age of 26, 28 and 28 years with extremes of 19 and 41 years [7, 8]. Our result could be explained by the fact that this age bracket corresponds to a period of full genital activity and procreation.

The high rate of professional women in our study could be explained by the high rate of illiteracy and unemployment in our country. These women are often married [9]. In our society, marriage is the legal framework for procreation, and any birth outside marriage is considered a dishonour to the family.

In our series, those not attending school were the most numerous with a frequency of 39.53%. According to the Guinean Demographic Health Survey (EDSG 2018), the unschooled are the largest group and have less information about reproductive health, which could be a major handicap in understanding the disease and its management, especially during pregnancy.

The Peulh ethnic group was the most affected in our study, with a frequency of 34.88%, followed by the Malinké and Sousou ethnic groups, with 30.23% each. This result could be explained by the consanguineous marriage within this ethnic group and the absence of compulsory pre-marital examination in customary marriages, which are quite common in our context.

The average parity of our pregnant women was 2, with primiparous women the most represented at 51.16%. Our result could be explained by the fact that women with sickle cell disease have difficulty reaching reproductive age and even when they do, their fertility is reduced, especially those who are homozygous.

In our study, our patients had different types of medico-obstetrical antecedents such as: vasoocclusive crises (46.5%), followed by anaemia (23.2%), miscarriage (11.6%), genital infection (6.9%), 4.7% foetal death in utero. This could be explained by the fact that most of these women had not received any follow-up because they were unaware of their condition, and once they were in the presence of triggering factors, such as cold, stress, intense physical effort, high altitude and fever, these attacks manifested themselves.

It was found that 97.67% of women did not have their check-up until the 3rd trimester of their pregnancy, and that no women had had their check-up in the 1st trimester.

The AS form was the most frequent form of sickle cell disease in our pregnant women (65%), and the SS form the least frequent with a frequency of 12%, followed by the SC form (23%). Our result is lower than that of MBODJI in France in 2012, who found a high frequency of the SS form (68%) in his study [10].

The high rate of the AS form could be explained by the high frequency of sickle cell disease in our region and consanguinity, which is a transmission factor for this disease.

More than half the pregnant women during their pregnancy had a normal haemoglobin level, i.e. greater than or equal to 11g/dl (72.09%). Of those meeting the definition of anaemia, 18.60% had a haemoglobin level of between 7 and 10g/dl and 9.30% had a haemoglobin level of less than 7g/dl.

Among the anaemic patients, only 9.3% could not tolerate their anaemia and were transfused with packed red blood cells, including 2 with SS and 2 with AS.

In contrast, Ribeil's study in Belo Horizonte, Brazil, in 2013 recorded a high frequency of transfused patients (67%) [11].

All our pregnant women benefited from medical treatment, even those of unknown phenotype, more occasionally during complications induced by the disease.

In our study, 37.2% of our patients had no complications during pregnancy. However, 27.9% had anaemia and 13.9% had a vaso-occlusive crisis (Table 2). Our results are similar to those found by Bonkian in Nancy in 2009, who in his study found anaemia and infection in all his patients [9]. And clearly superior to those of Adisso and Coll in Benin in 2013, who found 26.4% vaso-occlusive crises and 7.5% anaemia [3].

In our study, only one patient presented with complications.

Our results corroborate the data in the literature, which stipulates that these complications are among the acute

complications most frequently encountered in women with sickle cell disease during pregnancy.

During our study, 51.16% of patients gave birth at between 30 and 37 weeks of amenorrhoea. We did not record any cases of late delivery; 2.32% gave birth between 22 and 29 weeks of amenorrhoea. The mean term of delivery was 37.30 weeks with extremes of 22 to 41 weeks. This result is higher than that of Adisso and Coll in Benin in 2013, who found an average term of 36.9% [3].

Caesarean section was the most common method of delivery for 58.14% of patients, and 41.86% gave birth vaginally. The indications for caesarean section were obstetrical, including: SFA, 2nd degree narrowed pelvis, history of stillbirth, bicatric uterus, breech presentation in a primigravida, myoma previa.

Our result is lower than that of Igala M et al in Libreville who found 74.2% of caesarean sections in parturients whose main indication was vaso-occlusive crisis (52.2%) [12]. This high prevalence of caesarean section can be explained by the systematic use of prophylactic caesarean sections for certain indications.

All women with the SS phenotype underwent caesarean section; only 53.5% of women with the AS phenotype and 50% of women with the SC phenotype underwent caesarean section.

At 5 minutes, 88.37% of newborns had an Apgar score greater than or equal to 7. Hyacinthe Zamané et al. in their study found an Apgar score greater than or equal to 7 [13].

The 2500 to 3999g weight range was the most represented, with 85.7% of newborns born to mothers with the AS phenotype; 100% to mothers with the SS and SC phenotypes. Birth weights of less than 2500g were the least represented, with 14.3% from AS mothers. Our results are identical to those of Adisso et al in Benin who found a birth weight of 2584g [3] and different to those of Barfield WD in Massachusetts resident women of African descent with in-state deliveries (live birth or fetal death) who found a birth weigth of 2,126 less than 2500g [14]. The low birth weight may be explained by a decrease in intravascular volume, probably due to uteroplacental insufficiency.

We recorded 5 cases of foetal distress (11.62%), 2 cases of intrapartum death and hypotrophy with an equal frequency on each side of 4.7%. Our results can be explained by the chronic hypoxia of the foeto-placental unit, which is one of the main causes and consequences of anaemia and rheological abnormalities in the placenta (Table 3).

Post-partum complications were dominated by anaemia (9.5%). Pelvic peritonitis, arterial hypertension, vasocclusive crises and intestinal obstruction were in equal proportions (2.3%), whereas Igala M et al found that 64.5% of parturients presented with postpartum complications, dominated by anaemia in 80.0% of cases [12] and Villers MS et al still concluded that postpartum infection, sepsis and systemic inflammatory response syndrome were occurred in they are studies [15]. One of our parturients alone had three complications: anaemia, arterial hypertension and vas occlusive crisis (Table 3).

At the end of the pregnancies, a total of 32 births were recorded, of which 74.4% were live births and 4.7% were intrapartum deaths. We had no maternal deaths, but Igala M et al reported 88.2% live births and 11.8% deaths, and also reported a case of maternal death during caesarean section [12].

5. Conclusion

Sickle cell disease is one of the most common hereditary diseases affecting pregnant women in Guinea. Maternal complications were dominated by anaemia and foetal complications by acute foetal distress. Sickle cell disease in pregnant women needs to be diagnosed early, prevented and managed effectively in order to avoid maternal and perinatal complications. A comparison of the number of complications in the preconventional setting and during pregnancy would have provided a clearer picture of the study.

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