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Research Article

Maternal Outcomes in Women Complicated with sickle Cell Disease

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Abstract:

Background: Sickle cell disease is an autosomal recessive hemoglobinopathy that is characterised by vaso-occlusive complications, and pregnant women with this condition are more likely to experience adverse consequences for both the mother and the fetus.

Objective: The study design is to evaluate the maternal outcomes in women with sickle cell disease.

Methods: This case-control study was carried out at the Duhok Obstetrics and Gynaecology Teaching Hospital in Iraqi Kurdistan between March 2020 and March 2025 .The 77 pregnant women in the study were divide d into two groups: the study group, also known as the SCD group, consisted of 30 pregnant women with SCD and was compared to the control group, also known as the non-SCD group, which consisted of 47 pregnant women without SCD who gave birth at the same time for study group .The inclusion criteria were ,Pregnant women who had been previously diagnosed with homozygous SCD (HbSS), the diagnosis was determined through hemoglobin electrophoresis or genetic testing which relied on documented physician notes .The individuals with sickle cell trait or other SCD genotypes , smoker and twin pregnancy were excluded.

Results: Over the course of the study, the mean maternal age in the SCD patients was 23.14 ± 4.21 years, compared to 22.11 ± 3.11 years in the control group (P=0.221). Twenty-seven SCD patients (90 %) were primigravid, compared to 38.29 percent of the women in the control group. The mean number of admissions was 2.02 ± 1.01 for the SCD group, compared to 1.01± 0.01for the non-SCD group. There was a statistically significant difference ($p < 0.0001$).Vaso-occlusive crises were responsible for 14 cases (46.6%) of hospitalisations in the sickle cell disease group. The study discovered the following about the mode of delivery: Ten patients (33.33%) in the SCD group had birth vaginally. Only one patient (3.33%) had an operational vaginal delivery (OVD), while eleven patients (36.66%) needed an emergency caesarean delivery (CD). Forty-four patients (93.61%) in the control group had vaginal births.

Conclusions: sickle cell disease is still a significant factor in pregnancy and delivery-associated problems. A planned pregnancy with early scheduled antenatal care would be essential to provide sufficient healthcare in a tertiary hospital,

Keywords: hemoglobinopathy; maternal outcomes; maternal morbidity; maternal mortality; sickle cell disease; vaso-occlusive crisis

1.Introduction

Sickle cell disease (SCD) describes any of the syndromes in which the sickle mutation is co-inherited with a mutation at the other beta globin allele that decreases or eliminates normal beta globin production.

Obstetrical and fetal complications, as well as SCD-related medical complications, are more likely to occur in pregnancies due to metabolic needs, hypercoagulability, and vascular stasis morbidity and mortality can be considerably reduced by having access to a multidisciplinary care team that is educated on sickle cell disease and high-risk obstetrics [1,2].

The main characteristics of sickle cell disease (SCD) are haemolytic anaemia and vaso-occlusion, which can result in tissue ischaemia or infarction as well as acute and chronic discomfort. Early in life functional hyposplenism brought on by splenic infarction raises the risk of infection. Morbidity and mortality are significantly impacted by these consequences [3, 4].

Preconceptional evaluation and counselling should be carried out due to the risks of pregnancy for both the fetus and women with sickle cell disease (SCD). This includes testing the patient's partner for hemoglobinopathy to determine the type and risk of inherited disease in the offspring, followed by genetic counselling, stopping the use of medications that are contraindicated

during pregnancy (such as hydroxyurea, iron chelation, angiotensin converting enzyme inhibitors, and angiotensin II receptor blockers), updating immunisations, and providing information on the course of SCD during pregnancy, the impact of SCD on pregnancy, and the outcome of the infant [4,5,6,7].

SCD can be identified either prenatally or preimplantation. Many assisted reproductive methods can help prevent an impacted pregnancy.During pregnancy, severe anaemia and painful or vaso-occlusive crises are more frequent. Opioids should be used to treat extreme pain, just like in nonpregnant women. More frequent screening for asymptomatic bacteriuria, ultrasound screening for foetal growth restriction, foetal assessment in the third trimester, checking ferritin levels, and only administering iron supplements or prenatal vitamins with iron if the patient is iron deficient are some of the changes made to prenatal care for women with sickle cell disease. The first prenatal visit should be used to evaluate alloimmunisation, typically repeat such testing at 24 to 28 weeks and again at the time of birth if the results are initially negative.Foetal and neonatal haemolytic disease risk should be assessed in women with alloantibodies and treated appropriately. In order to ensure that appropriate blood is available for transfusion, if necessary, the blood bank should also be informed [4,8,9,10,11].

To lower the risk of vaso-occlusion, it's critical keep warm, hydration and oxygen, and take precautions against infection. With the exception of nonsteroidal anti-inflammatory medicines (NSAIDs), which are often avoided after 30 weeks of gestation due to an increased risk of premature closure of the ductus arteriosus, the therapy of painful vaso-occlusive episodes is the same as that for women who are not pregnant.The cornerstone of treatment for both pregnant and non pregnant women is opioids. It is ecommend prophylactic transfusion therapy for SCD patients who are at high risk of complications. A multidisciplinary team should be involved in customising transfusion therapy. Transfusion is also beneficial for expectant mothers with acute SCD problems [4,11,12].

Vaginal delivery is not medically contraindicated in SCD patients. It is reasonable to wait for spontaneous labour if there are no risk for either the mother or the fetus. Only the standard obstetrical indications are used to induce labour and conduct caesarean delivery. It is recommend postpartum preventive anticoagulation for women with sickle cell disease (SCD) who have caesarean deliveries. Additionally, Low molecular weight heparin (LMWH)is given following vaginal birth [4,13,14].

The length of postpartum therapy following caesarean delivery is depend on the individual. Patients with a HbSS genotype, a history of moderate to severe sickle cell disease, advanced age, pulmonary disease, an indwelling central venous catheter, a high platelet count, a history of VTE, or other VTE risk factors are typically administered LMWH for six weeks. Pharmacologic thromboprophylaxis should be administered for five days following vaginal delivery; however, patients who stay in the hospital should continue taking anticoagulants. For women with sickle cell disease, hormonal contraceptives and the copper-releasing intrauterine device (IUD) are safe and efficient options. [4.15,16,17].

2.Patients and Methods

Between March 2020 and March 2025, this case-control study was carried out at the Duhok Obstetrics and Gynaecology Teaching Hospital in Iraqi Kurdistan. The Duhok Obstetrics and Genecology Teaching Hospital's Committee of Scientific Research Unit gave its approval to this work. All participants gave their informed consent. The 77 pregnant women in the study were divided into two groups: the study group, also known as the SCD group, consisted of 30 pregnant women with SCD and was compared to the control group, also known as the non-SCD group, which consisted of 47 pregnant women without SCD who gave birth at the same time for study group. The Duhok Obstetrics and Genecology Teaching Hospital, which offers specialised care to mothers referred from primary or secondary centers that are unable to offer such services, is where these mothers gave birth.

The inclusion criteria were, Pregnant women who had been previously diagnosed with homozygous SCD (HbSS), the diagnosis was determined through hemoglobin electrophoresis or genetic testing which relied on documented physician notes. The individuals with sickle cell trait or other SCD genotypes, smoker and twin pregnancy were excluded.

These patients' baseline characteristics, such as maternal age, parity, gestational age (GA) at delivery, and race, were all recoded following a thorough history, clinical examination, and investigations. For both groups, data was also collected on the mode of birth and antenatal complications. Baseline characteristics, antenatal complications and mode of delivery were compared between the two groups.

Statistical analysis

A software program current versions IBM (SPSS) Statistic, was used to statistically analyse the data. Quantitative variables were expressed as mean ± standard deviation while, descriptive statistics for nominal variables were expressed as numbers and percentages (%). The difference in the means of the quantitative variables was examined using the Student's t-test. To compare categorical data, the chi-square distribution test was employed. Results were interpreted as significant if the p-value was less than 0.05.

3-Results

Over the course of the study, between March 2020 and March 2025, thirty pregnant women with homozygous SCD (HbSS) were compared to the control group, which included forty-seven pregnant women without SCD.

MATERNAL CHARACTERISTICS	SCD GROUP (N=30)	NON-SCD GROUP (N=47)	*P*-VALUE
Maternal age (years)	23.14 ± 4.21	22.11± 3.11	0.221
Parity Primigrav Multigravida	 27(90%) 3(10%)	 18(38.29%) 29(61,70%)	< 0.0001
Race White Non-White	 7(23,33%) 23(76.66%)	 31(65,95%) 16(34.04%)	< 0.0003
GA at delivery (weeks)	36.21±1.12	39.11±1.13	< 0.0001

Table 1: Summarises the baseline characteristics of the mothers with SCD and the non-SCD groups.

Quantitative variables presented as mean ± SD, nominal variables as number (percent), P < 0.05 = Significant, P < 0.001 =highly significant, P > 0.05 = Not significant

The mean maternal age in the SCD patients was 23.14 ± 4.21 years, compared to 22.11 ± 3.11 years in the control group (P=0.221). The women in the two groups did not differ significantly in terms of maternal age.

Twenty-seven SCD patients (90 %) were primigravid, compared to 38.29 percent of the women in the control group.Ten percent of the SCD group and sixty-one percent of the control group were multigravida; P < 0.0001.The two groups' differences in parity were statistically highly significant.

In terms of race for both groups, the majority of SCD patients (76.66%) were not white, compared to (34.04%) of the control group, with a p-value less than 0.0001, this difference was statistically highly significant.

The SCD group's mean gestational age at delivery was 36.21± 1.12 weeks, whereas the other group's was 39.11± 1.13 weeks. With a p-value of less than 0.000, this difference was statistically highly significant.

ANTENATAL COMPLICATIONS	SCD GROUP (N=30)	NON-SCD GROUP (N=47)	*P*-VALUE
Number of admissions	2.02 ± 1.01	1.01± 0.01	< 0.0001
Vaso-occlusive crises	14(46.6%)	0(%)	
Anemia	15(50 %)	1(2.12 %)	0.033
UTI	4(13.3 %)	2(4.25%)	0.150
GDM	2(6.6%)	5(10.6%)	0.553
PE	9(30%)	3(6.38%)	0.005
blood transfusion	11(38.6%)	1(2.12 %)	0.0001
FGR	9(30%)	2(4.25%)	0.001
VTE	0(%)	0(%)	
PPH	0(%)	0(%)	
Maternal mortality	0(%)	0(%)	
IUFD	0(%)	0(%)	
Congenital anomalies	0(%)	0(%)	

Table 2: provides a summary of antenatal complications for the mothers with SCD and the non-SCD groups.

Quantitative variables presented as mean ± SD, nominal variables as number (percent), P < 0.05 = Significant, P < 0.001 =highly significant, P > 0.05 = Not significant

The mean number of admissions was 2.02 ± 1.01 for the SCD group, compared to 1.01± 0.01for the non-SCD group. There was a statistically significant difference (p< 0.0001).

Vaso-occlusive crises were responsible for 14 cases (46.6%) of hospitalisations in the sickle cell disease group. Only one case in the non-SCD group had anaemia, compared to 15 cases (50%) in the SCD group. There were statistically significant differences between the two groups.

Four cases (13.3%) of the SCD group had urinary tract infections (UTIs) that required hospitalisation, compared to two cases in the non-SCD group. The two groups' differences were not statistically significant.

Compared to 5 out of 47 patients (10.6%) in the control group, 2 out of 30 patients (6.6%) in the SCD group developed gestational diabetes. There was no statistically significant difference (p = 0.553).

Two cases (4.25%) in the non-SCD group and nine cases (30%) in the SCD group had pregnancies complicated by fetal growth restriction (FGR). There was a statistically significant difference. (p =0.001).

Nine cases (30%) had preeclampsia in SCD group, Only one case developed eclampsia. There were no cases of eclampsia in the non-SCD group, however three cases (6.38%) experienced preeclampsia. The two groups' differences were statistically significant (p =0.005).

There were no reports of maternal death, venous thrombo-embolism (VTE), postpartum haemorrhage (PPH), congenital abnormalities, or intrauterine foetal death (IUFD).

MODE OF DELIVERY	SCD GROUP (N=30)	NON-SCD GROUP (N=47)	*P*-VALUE
Spontaneous vaginal delivery	10(33.33%)	44(93.61%)	< 0.0001
IOL	7(23.33%)	1(2.12%)	0.003
Elective CD	0(%)	8(26.66%)	
Emergency CD	11(36.66%)	2(4.25 %)	0.0002
OVD	1 (3.33%)	1(2.12 %)	0.746

Table 3: provides a summary of the mode of delivery for the mothers with SCD and the non-SCD groups.

Nominal variables as number (percent), P < 0.05 = Significant, P < 0.001 =highly significant, P > 0.05 = Not significant

The study discovered the following about the mode of delivery: Ten patients (33.33%) in the SCD group had birth vaginally. Only one patient (3.33%) had an operational vaginal delivery (OVD), while eleven patients (36.66%) needed an emergency caesarean delivery (CD). Forty-four patients (93.61%) in the control group had vaginal births. Eight patients (26.66%) underwent elective caesarean sections, whereas two patients (4.25%) needed an emergency caesarean section. OVD was performed on one patient (2.12%).

Crucially, the statistical analysis revealed notable variations in the two groups' delivery methods.

4-Discussion

Sickle cell disease during pregnancy are more likely to experience maternal morbidity and mortality. However, multidisciplinary care can result in positive outcomes for both the mother and the fetus [18,19,20,21].

According to our data, the majority of SCD patients were primigravida, as women with SCD have a long inter-pregnancy interval and low parity due to pregnancy complications associated with the disease but pregnancy rates did not differ, according to a prior study on reproductive issues in SCD in Brazil [22].

In our study the majority of SCD patients were non-white, which is consistent with a study that indicated the most of SCD patients were black [23]. The study's mean gestational age at delivery for SCD patients was (36.21±1.12), which is similar to the Koshy et al [24].

According to our findings, the SCD group experienced a considerably higher number of antenatal hospital hospitalisations than the non-SCD group. For the SCD group, anaemia and vaso-ooclusive crises were frequent reasons for hospitalisation. Vaso-ooclusive crises accounted for the majority of antenatal admissions, according to one study [25]. Anaemia was the most common cause, followed by sickle cell crises, according to a 10-year retrospective research [26].

Our investigation found that there was a significant difference in the incidence of preeclampsia between the two groups. This is in line with the results of many other investigations that found a significantly higher incidence of preeclampsia in women with sickle cell disease [27–29]. This contrasts with three previous studies conducted in Bahrain [30–32]. There is no conclusive evidence in the literature or published research linking gestational diabetes and sickle cell disease. Interestingly, our results revealed that the SCD group had a considerably lower incidence of gestational diabetes mellitus than the non-SCD group. Women had significantly higher rates of UTI during their pregnancy than controls.

While there was no significant difference in the prevalence of UTIs between mothers with SCD and controls in our investigation, a meta-analysis study conducted in Bahrain revealed a statistically significant elevated risk of UTIs in pregnant women with SCD [31,33].

Compared to the controls, the prevalence of blood transfusions was substantially greater among SCD women. The findings of a systematic review that demonstrated a statistically significant elevated risk of blood transfusions are in line with this [31].According to our research, we found increasing the risk of fetal growth restriction , utero-placental vascular stasis, a history of preeclampsia, and a history of severe anaemia all increase the likelihood of fetal growth restriction [34–35].In the SCD group, no congenital anomalies were seen, also SCD did not raise the risk of IUFD in our investigation; this could be because of timely delivery and antenatal fetal surveillance , which was similar to what was discovered in another study [31].

In our investigation, there was no maternal mortality among the SCD patients. There was no significant difference in maternal fatalities between the SCD and control groups, according to our study and the one study [31]. However, a number of additional investigations have discovered that SCD patients had a markedly higher maternal death rate [36,37].

Our findings showed a significant difference in the two groups' modes of delivery, including caesarean sections, which is in line with researches showing that individuals with sickle cell disease have a greater rate of caesarean deliveries [28,29,33]. In contrast, with one study's findings [31].

Strengths and limitations

It should be noted that this study had three limitations. First, the sample size was too small. The second limitation of the study was that it was limited to short-term maternal outcomes during delivery. The third limitation, we were unable to study the impact of treatment on pregnancy outcomes. The study's main Strengths were that it was carried out at a tertiary center in Duhok city that the patient was delivered by a skilled obstetrician and where care was regularly and freely provided lastly it was able to choose a comparable group of pregnancies that were unaffected by SCD and matched on year of delivery.

5-Conclusions

sickle cell disease is still a significant factor in pregnancy and delivery-associated problems. A planned pregnancy with early scheduled antenatal care would be essential to provide sufficient healthcare in a tertiary hospital,it need a multidisciplinary team of skilled pediatricians, obstetricians, and hematologists to closely monitors these pregnancies.

Abbreviations

'Not applicable'

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Data availability

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request

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Contributions: Banav N Sulevanay (manuscript writing/editing, Data analysis, data collection collection., design of the study and revised the manuscript for intellectual content).

Ethics declarations

The ethical approval of the study protocol was received from the Duhok OBGYN Teaching Hospital Scientific Committee. In compliance with ethical guidelines, involving human populations, Informed Consent was obtained from all patients. All procedures were carried out in accordance with the Helsinki Declaration. patient confidentiality was safeguarded by anonymizing personal data. All required permissions were obtained from relevant institutional authorities before data collection.

Competing interests

The authors declare no competing interests.

Consent for publication

'Not applicable' for that section

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