Pregnancy Outcome of Sickle Cell Disease Women

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Objective: To evaluate the maternal and fetal outcome in pregnant women with sickle cell disease (SCD) compared with healthy women.

Setting: Department of Gynecology and Obstetrics, Salmaniya Medical Complex, Bahrain.

Design: Retrospective Case-Control Study.

Method: Patients with SCD who delivered from 1 January 2011 to 31 December 2012 were reviewed. The matched controls had neither SCD nor sickle cell trait.

Result: Patients with sickle cell disease required significantly more admissions during their pregnancy, 135 (78.4%) compared to the control, 74 (37.4%). One hundred thirteen (65.6%) SCD patients were admitted with vaso-occlusive crises and 18 (10.4%) with hemolytic crises. SCD patients had a significant decrease in parity, gestational age and birth weight compared with the control group. SCD patients had a significant rise in the incidence of urinary tract infection, but there was no difference between both groups in the incidence of hypertensive disorders, mode of delivery and perinatal outcome.

Four (2.3%) patients with SCD died; two (1.2%) patients died due to pulmonary embolism, one (0.6%) due to acute chest syndrome and one due sepsis and disseminated intravascular coagulopathy.

Conclusion: Sickle cell disease is hazardous both to the mother and the fetus and is associated with high maternal morbidity and mortality.

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Sickle cell disease (SCD) is common hemoglobinopathy in Bahrain[1]. It continued to be a major health problem in spite of the decline of its incidence from 2% to reach 0.4%[2,3]. The incidence of SCD amongst pregnant women in Bahrain has also dropped from 0.8% to 0.5%; however, SCD continued to be the leading cause of maternal deaths amongst Bahraini women[4-6].

SCD is associated with high significant maternal morbidity[7-10]. Villers et al revealed that these women are at increased risk of medical complications, such as thrombo-embolism, stroke, pulmonary hypertension, infection and acute chest syndrome[7]. These patients were found to have an increased risk of antenatal complications with the exception of diabetes mellitus.

El Shafei et al showed that women with SCD are more likely to have anemia, infection, intrauterine growth restriction IUGR, congenital abnormality, preterm delivery and cesarean section[4]. These women had a significant increase in the rate of hospitalization mainly due to vaso-occlusive crises followed by hemolytic crises[5,8].

Though there are many studies that address management and pregnancy outcome of sickle cell disease women, most studies were retrospective, cohort or case-control. There is a lack of prospective randomized case-control studies in this field. The data published from our center included the SCD patients who delivered in 2002 which showed increased incidence of spontaneous abortion, preterm labour, IUGR and cesarean section rates among SCD patients[5].

The aim of this study is to evaluate the maternal and fetal outcome in pregnant women with sickle cell disease compared with healthy women.

METHOD

The data of pregnant women with SCD who delivered from 1 January 2011 to 31 December 2012 were reviewed. Matched control group who had neither SCD nor sickle cell trait were identified by reviewing the labor ward registry.

The following data were documented: nationality, age, gravidity, parity, gestational age and the reason for admission. The following

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complications were documented: urinary tract infection, pneumonia, acute chest syndrome, thromboembolism, premature rupture of membrane, hypertension, pre-eclampsia and intrauterine growth restriction. Type of delivery, birth weight, newborn outcome and postnatal complications were documented. Data was analyzed using SPSS version 21.

RESULT

One hundred seventy-two SCD patients delivered at SMC between 1 January 2011 to 31 December 2012. The matched control group was 198 patients who had neither SCD nor sickle cell trait.

The mean of maternal age of SCD patients was 28.1 ± 5.55 years, while the mean maternal age of the control group was 29.8 ± 6.72 years. The difference between both groups was significant, see table 1.

Table 1: Sickle Cell Disease Patients and Control Group Characteristics

Variable		Mean	Standard Deviation	95% CI Lower	95% CI Upper	Significance P-Value
Age	Control	29.88	6.726	29.70	30.87	0.0062
	SCD	28.12	5.550	27.29	28.96	
Parity	Control	1.75	1.493	1.54	1.96	0.0001
	SCD	1.19	1.28	0.99	1.38	
Gestational Age	Control	38.21	2.04	37.93	38.50	0.00007
	SCD	37.44	1.64	37.20	37.70	
Birth Weight	Control	3.127	0.603	3.04	3.21	0.000007
	SCD	2.86	0.517	2.78	2.94	

The mean of the parity in SCD group was 1.19 ± 1.19 compared with 1.75 ± 1.49 in the control group; the difference was significant, see table 1. Amongst the SCD group, 57 (33.1%) were primigravidas and 115 (66.9%) were multiparous. Forty-four (22.2%) were primigravidas in the control group and 154 (77.8%) were multiparous.

The mean gestational age in SCD patients was 37.45 ± 1.64 weeks and 38.2 ± 2.040 weeks in the control group. There was a significant difference between the two groups in gestational age.

The mean birth weight in SCD group was 2,860 ± 517 grams compared to 3,130 grams ± 603 grams in the control group. Low-birth-weight (less than 2000 grams) was 11 (6.3%) in SCD group and was 6 (3%) in the control group. There was a significant difference in birth-weight between the two groups.

One hundred thirty-five (78.4%) patients with sickle cell disease required admission during their pregnancy compared to 74 (37.4%) of the control group; the difference was significant. One hundred thirteen (65.3%) SCD patients were admitted with vaso-occlusive crises and 18 (10.4%) patients with hemolytic crises. Twenty patients (11.6%) SCD patients had urinary tract infection compared to 9 (4.5%) patients in the control group; the difference was significant, see table 2.

Table 2: Antenatal Complications in SCD and Control Group

Variable		Frequency	Percentage	P-Value
Antenatal Admission	Control (n=198)	74	37.4%	0.000*
	SCD (n=172)	135	78.5%	
UTI	Control	9	4.5%	0.011*
	SCD	20	11.6%	
Hypertension	Control	13	6.6%	0.765
	SCD	10	5.8%	
Eclampsia	Control	4	2%	0.770
	SCD	2	1.2%	
PIH	Control	3	1.5%	0.862
	SCD	3	1.7%	
PROM	Control	7	3.5%	0.289
	SCD	3	1.7%	
IUGR	Control	9	4.5%	0.581
	SCD	10	5.8%	
Others	Control	15	7.6%	0.001*
	SCD	34	19.8%	
Maternal Mortality	Control	1	0.5%	0.13
	SCD	4	2.3%	
Perinatal Mortality	Control	6	3%	0.588
	SCD	7	4%	

UTI: Urinary Tract Infection
PIH: Pregnancy-Induced Hypertension
PROM: Premature Rupture of Membranes
IUGR: Intrauterine Growth Restriction

In SCD group, 10 (5.8%) patients had high blood pressure, 2 (1.2%) had eclampsia and 3 (1.7%) had pregnancy-induced hypertension (PIH). Thirteen (6.6%) patients in the control were admitted with high blood pressure, 3 (1.5%) developed PIH and 4 (2%) had eclampsia. There was no statistical difference in the incidence of hypertensive disorders in both groups.

Premature rupture of membranes occurred in 3 (1.7%) patients with SCD and 7 (3.5%) of the control group, no statistical significance. Ten (5.8%) SCD patients had intrauterine growth restriction compared to 9 (4.5%) of the control group, no statistical significance, see table 2.

One hundred eleven (64.5%) SCD patients had normal spontaneous vaginal delivery (NSVD) compared to 143 (72.2%) of the control group, no statistical significance. Two (1.2%) SCD patients had instrumental delivery and 3 (1.5%) in the control group, no statistical significance. The incidence of assisted breech delivery in SCD group was 6 (3.5%) and 2 (1%) in the control group, no statistical significance. Fifty-two (30%) SCD patients had cesarean section compared to 50 (25%) in the control group, no statistical significance, see table 3.

Table 3: The Mode of Delivery in SCD and Control group

Mode of Delivery	Control Patient		Sickle Cell Patient		P-Value
	Frequency	Percentage	Frequency	Percentage	
Normal Vaginal Delivery	143	72.2%	111	64.5%	0.112
Lower Segment Caesarean Section	50	25.3%	52	30.2%	0.285
Instrumental Delivery	3	1.5%	2	1.2%	0.542
Assisted Breech Delivery	2	1%	6	3.5%	0.10
Undelivered*	0	0	1	0.6%	
Total	**198**	**100%**	**172**	**100%**	

*One patient in SCD group died in the antenatal period at 34 weeks gestation due to pulmonary embolism

Perinatal mortality was 7 (4%) babies in SCD group compared to 6 (3%) in the control group, no significant difference (P-Value 0.588).

Four patients (2.3%) with SCD died during the study period; two patients died due to pulmonary embolism, the third due to acute chest syndrome and the fourth had sepsis and disseminated intravascular coagulopathy (DIC). One patient died in the control group due to amniotic fluid embolism leading to postpartum hemorrhage.

DISCUSSION

This study showed that patients with SCD required significantly higher number of admissions compared to the control group. About 65% of SCD patients were admitted with vaso-occlusive crises and 10% with hemolytic crises. This study revealed that pregnancy precipitated painful crises and increased the rate of hospitalizations. Other studies also showed that SCD worsens during pregnancy[4,5,7,8]. This finding was similar to those findings of Rajab et al as vaso-occlusive crises were found to be the most common indication for hospitalization (42%) followed by hemolytic crises (28%)[5]. A study conducted by Yu et al found that sickling crisis is requiring admission in 47% of the antenatal patients and more frequently in the third trimester[11].

The incidence of urinary tract infection amongst SCD group was 11.6% compared to 3.5% in the control group; the difference was statistically significant. Different studies showed that SCD patients are more likely to experience urinary tract infection than non-SCD patients[4,7,8]. Villers et al found that SCD patients had seven-fold increase of asymptomatic bacteriuria and two-fold rise in the genito-urinary tract infection[7].

This study showed that there was no significant difference in the incidences of hypertensive disorders in SCD patients compared with the control group. A similar observation was made by previous studies[4,5,10,12]. However, this finding was inconsistent with other studies which showed that gestational hypertension and preeclampsia significantly increased in SCD patients[7,9,13].

The mean gestational age was significantly lower in SCD group compared to the control. Other studies showed a significant increase in the incidence of preterm delivery[4,5,7,11,13]. El-Shafei et al found three-fold increase in preterm delivery in SCD patients[4].

This study showed that SCD patients had a significantly lower birth-weight compared to the control group. Other studies found that SCD patients had a higher risk of low-birth weight[4,5,7,14,15]. The pathophysiology for increased low-birth-weight in SCD patients could be attributed to compromised placental blood flow due to vaso-occlusion and chronic maternal anemia[16].

The risk of fetal death was not increased in our study, and this may be attributed to improved fetal monitoring and the increased likelihood of intervention. On the other hand, different studies showed a significant increase in perinatal mortality amongst SCD patients[9,10,15,16]. The perinatal mortality varied from 10/1000 in Smith's study and 187/1000 in Alfolabi's study[8,9,17].

The incidence of cesarean section in SCD patients was 30% compared to 25% in the control group, no significance difference. Other studies have shown that cesarean deliveries were more likely to be performed for pregnant women with SCD than those in the control group[4,5,7]. Cesarean sections are more likely performed because of fetal compromise, closer fetal monitoring and lower threshold to tolerate non-reassuring fetal heart pattern[7].

Four SCD patients died during the study period. In a recent study conducted on maternal mortality in Bahrain, SCD was found to be the leading cause of maternal death, and it accounted for 30% of deaths[6]. The maternal mortality for SCD women was found to be 6 to 117 times higher than general population[6,7,13]. Thromboembolic events have been implicated in maternal death amongst SCD patients as they are more likely to have cerebral vein thrombosis or deep vein thrombosis[7].

Compared to previous two studies on pregnancy outcome amongst SCD patients in SMC, SCD continues to carry significantly high morbidity and mortality[4,5]. Therefore, pregnant women with SCD should be monitored very closely. SCD could be eradicated by health education, premarital counseling, prenatal diagnosis and family planning.

CONCLUSION

Sickle cell disease is hazardous both to the mother and the fetus and is associated with high maternal morbidity and mortality. Women with SCD required frequent hospitalization for vaso-occlusive crisis. The outcome of the pregnancy in sickle cell disease remains variable and unpredictable.

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