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ORIGINAL ARTICLE

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Pregnancy outcome in women with sickle cell disease / trait

[1] Sonwane *Anju S*, [2] Zodpey *Sanjay Pralhadrao*

Rural Hospital, Karanja (Ghadge), Wardha, and Department of Preventive and Social Medicine, Government Medical College, Nagpur, (Maharashtra).

OBJECTIVE(S) : To study the complications, mode of delivery and the outcome of pregnancy in women with sickle cell disease / trait.

METHOD(S) : This is a comparitive study. Study group (subjects) consisted of 118 pregnant women with sickle cell disease / sickle cell trait who were attending the antenatal clinic or were admitted in obstetric wards and followed up till 7th day after delivery. The control group consisted of 236 age and gravidity matched pregnant women who did not have sickle cell disease / trait recruited from the same hospital.

RESULTS : Statistically significant complications during pregnancy included anemia, crisis, and toxemia. Incidence of preterm deliveries, cesarean section, adverse fetal outcome in terms of still births, intrauterine deaths, early neonatal deaths, and low birth weight were significantly higher in the study group than in the control group.

CONCLUSION(S) : Incidence of toxemia was alarming among the women with sickle cell trait and was found to be more deleterious than previously thought. Complications of sickle cell disease-trait precipitate the onset of delivery (preterm deliveries 72% vs 30.10%) and significantly more cesarean sections were carried out to improve the pregnancy outcome (p=0.0257).

Key words : pregnancy outcome, sickle cell disease, sickle cell trait, sickle cell hemoglobinopathy

Introduction

The world population report (1975) gives the incidence of anemia to be 100% among pregnant women in India [1]. Although it has declined over a period of time, it still persists at a higher level when compared to that in other countries. Sickle cell hemoglobinopathy and G6PD deficiency are additional factors that lead to or aggravate anemia during pregnancy. Both maternal and fetal risks are increased when women with sickle cell disease become pregnant.

Sickle cell trait is also potentially dangerous in the presence of certain disease states, and in healthy persons under certain circumstances which lead to anoxia, dehydration or physical stress. Meticulous care, coupled with close hematologic consultation has resulted in a major reduction in maternal mortality in women with sickle cell disease but benefits to the fetus have been less striking. Once septicemia and toxemia are successfully controlled sickle cell anemia will surely attain an important position in maternal deaths in the next decade [2].

Hence this study was undertaken to assess the pregnancy outcome, complications related to pregnancy, mode of delivery, and indications of cesarean section among women with sickle cell disease and trait.

Methods

This is a comparitive study carried out at a tertiary care hospital, a part of the medical college.

The study subjects were selected from obstetric wards and antenatal clinic. Those who were diagnosed as having sickle

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Correspondence :
Dr. Sanjay P. Zodpey
A/303, Amar Enclave, Prashant Nagar, Ajni,
Nagpur - 15 (Maharashtra).
Tel. 0712 2247283, 9823289697 Email : spzodpey@yahoo.com

cell disease or trait during antenatal visits or during routine health care or in previous pregnancy, or in early first trimester were included in the study. Two controls were selected for each subject by matching age and gravidity.

A total of 25 women with sickle cell disease, 93 with sickle cell trait and 236 controls were recruited in their third trimester i.e. after 28 weeks of pregnancy. A thorough obstetric history, significant past history, and family history of sickle cell disease / trait were recorded. Detailed clinical examination, and blood and urine tests were carried out at the time of registration. These women were followed up in antenatal clinic and obstetric wards till 7th day after delivery to know any complications and pregnancy outcome.

The demographic characteristics of women like age, gravidity, caste/religion, family history, socioeconomic status, complications during pregnancy or at the time of delivery or in the first 7 days of puerperium, mode of delivery, and fetal outcome (age of gestation at birth, birth weight, live birth/ stillbirth) were analyzed.

Results and Discussion

The mean hemoglobin level in the SS (homozygous sickling) group (7.65 ± 1.6579 g/dL) was significantly lower as compared to that in the AS (hyterozyeous sickling) group (8.77 ± 1.0964 g/dL) and to that in the AA (nonsickling) group (9.369 ± 0.7421 g/dL). Also mean hemoglobin level in the AS group was significantly lower than that in the AA group (Table 1).

Table 2 gives the complications met with.

Table 1. Hemoglobin levels.

Hemoglobin (g/dL)	Subjects				Controls	
	SS		AS		AA	
	Number	Percent	Number	Percent	Number	Percent
<8	14	56.0	21	22.58	05	2.12
8-10	11	44.0	67	72,04	215	91,1
>10	00	—	05	5.37	16	6.78
Total	25	100	93	100	236	100

Table 2. Complications during pregnancy and child birth.

Complications	Subjects				Controls	
	SS		AS		AA	
	Number	Percent	Number	Percent	Number	Percent
Crisis	10	40	4	4.30	-	-
Chronic bronchitis	-	-	1	1.07	1	0.42
Pneumonia	2	8	-	-	1	0.42
Urinary infection	-	-	1	1.07	1	0.42
Pyelonephritis	-	-	-	-	-	-
Pulmonary embolism	-	-	-	-	-	-
Pre-eclampsia	5	20	34	36.55	34	14.40
Eclampsia	1	4	4	4.30	1	0.42
Severe anemia	6	24	11	11.82	4	1.69
Fever	4	4	1	1.07	1	0.42
Ascites	1	4	-	-	-	-
Congestive cardiac failure	2	8	-	-	-	-
Jaundice	1	4	1	1.07	-	-
Shock	-	-	1	1.07		
Placenta previa	-	-	1	1.07		
Disseminated intravascular coagulation	1	4	1	1.07		
HELLP syndrome	-	-	1	1.07		
Avascular necrosis of the hip	1	4	0	-	-	-
Postparum hemorrhage	1	4	1	1.07	-	-
Maternal death	1	4	-	-	-	-

Table 3. Indications of cesarean section.

Indications	Subjects				Controls	
	SS (n=16)		AS (n=43)		AA (n=96)	
	Number	Percent	Number	Percent	Number	Percent
Cephalopelvic disproportion	2	12.50	9	20.93	14	14.58
Abnormal lie	2	12.50	6	13.95	15	15.62
Maternal complication	12	75.00	36	83.72	71	73.95
Fetal complication	6	37.50	15	35.88	46	47.91
Abnormal placenta	3	18.750	3	6.97	03	3.313

Some women had more than one indication.

Table 4. Fetal outcome.

Fetal outcome	Subejcts				Controls	
	SS (n=25) Number	Percent	AS (n=93) Number	Percent	AA (n=236) Number	Percent
Live birth	21	77.77	83	85.56	230	97.05
Intrauterine death	2	7.40	2	2.06	2	0.84
Stillbirth	3	11.11	8	2.06	1	0.42
Early neonatal death	1	3.7	4	4.12	4	1.68
Total	27	100	97	100	237	100

Table 5. Distribution of study subjects according to birth weight of babies

Birth weight (g)	Subject				Controls	
	SS (n=25)		AS (n=93)		AA (n=236)	
	Number	Percent	Number	Percent	Number	Percent
≤ 999	1	3.70	3	3.09	0	0
1000 – 1499	2	7.40	6	6.18	5	2.11
1500 – 1999	11	40.74	12	12.37	16	6.75
2000 – 2499	7	25.93	26	26.80	62	26.16
≥ 2500	6	22.22	50	51.55	154	64.98
Total	27	100	97	100	237	100

Among the complications during pregnancy, crisis was significantly more among the SS group as compared to that in the AS group (40% vs 4.30%, P < 0.0001; OR 14.83, 95% CI 3.58-70.88). Crisis as complication during pregnancy is reported to be 48.6% by Dare et al [3], 56% by El Shafei et al [4], 28% by Chhabra et al [5], 88% Leborgne et al [6] and 41.4% by Odum et al [7].

Pre-eclampsia was significantly more in the AS group as compared to that in the AA group (36.55% vs 14.40%, P<0.0001; OR 3.42, 95% CI 1.89-6.21). Pre-eclampsia among women with sickle cell disease was observed to be 2.4% by Idrissa et al [8], 16.2% by Dare et al [3], and 12.62% by Deshmukh et al [9]. Eclampsia was also significantly more among the AS group as compared to that in the AA group (4.30% vs 0.42%, P=0.0238; OR 10.56, 95% CI 1.02-22.5 27). Severe anemia i.e. hemoglobin level < 7 g/dL was significantly more in the SS group (24%) and AS group (11.82%) as compared to AA group (1.69%) (SS vs AAP < 0.0001; OR 18.32, 95% CI 3.86 - 93.81; and AS vs AAP < 0.0001; OR 7.78, 95% CI 2.21-34.19).

When compared to the control group there were significantly more preterm deliveries in the SS group (72% vs 15.25%,

P < 0.0001; OR 14.29, 95% CI 5.15-40.00) and AS group (30.10% vs 15.25%, P 0.0022; OR 2.39, 95% CI 1.31-4.39). There were significantly more preterm deliveries among the SS group as compared to AS group (72% vs 30.10%, P < 0.0001; OR 5.9, 95% CI 2.05-17.94). In women with sickle cell disease, preterm deliveries are reported to be 21.6% by Dare et al [3], 20% by Chhabra et al[5], 23% by Howard et al [10] and 21% by Leborgene et al [6].

Majority of cesarean sections in all the three groups were due to maternal complications (Table 3). Cesarean section was required in 16 out of 25 (64%) in the SS group, 43 out of 93 (46.24%) in the AS group, and 96 out of 236 (40.68%) in the AA group, (SS group vs AA group - P 0.0251; OR 2.59, 95% CI 1.03-6.6; and AS group vs AA group - P=0.3580; OR 1.25, 95% CI 0.75-2.09) (Table 3). The cesarean section rate is reported to be 14.6% by Idrisa et al [8], 29.7% by Dare et al [3], 12% by EI Shafei et l [4], 66.66% by Howard et al, 10. 48% by Leborgne et al [6], and 43.2% by Odum et al [7].

The 12 maternal complications in the SS group included pre-eclampsia (24%), severe anemia (8%) and previous cesarean section (8%) followed by eclampsia, premature rupture of membranes, severe oligohydramnios, unfavorable cervix, disseminated intravascular coagulation, and bad obstetric history (4% each). The 71 maternal complications in the AA group included previous cesarean section (14.41%) and pre-eclampsia (9.75%) followed by premature supture of membranes and failure to progress (3.4% each). The 36 complciations in the AS group included previous cesarean section (16.13%), pre-eclampsia (16.13%), severe anemia (5.13%), and premature rupture of membranes (4.30%).

Dare et al [3] reported that among the 29.7% cesarean sections, indications for cesarean section were CPD in 45.5%, fetal distress associated with IUGR in 18.1%, and transverse lie, pseudotoxemia, severe pre-eclampsia with failed induction of labor and placenta previa in 9% each. Indications reported by El Shafei et al [4] were fetal distress in 67%, CPD in 10%, previous cesarean section in 10% and miscellaneous in 13% (overall incidence 12%).

When compared to the control group there was significantly higher risk of adverse fetal outcome in the SS group (22.23% vs 2.95%, P = 0.0006; OR 9.39, 95% CI 2.34-35.53) and in the AS group (14.44% vs 2.95%, P < 0.0001; OR 5.54, 95% CI 2.01-15.78). Adverse fetal outcome included still birth, followed by intrauterine death and early neonatal death (Table 4). Seven et al [11] reported that there was no significant difference in pregnancy outcome among sickle cell disease and control group in term of perinatal mortality.

Table 5 shows that incidence of low birth weight (LBW) babies was 77.78% in the SS group, 48.45% in the AS group and 35.02% in the control group. Compared to that in the control group, the risk of LBW was significantly more in the SS group (P < 0.0001; OR 6.49, 95% CI 2.40-20.31) and in the AS group (P 0.0233; OR 1.74, 95% CI 1.05-2.90) Similar by the risk of LBW babies was significantly higher among SS group as compared to AS group (P = 0.0067; OR 3.72,95% CI 1.29-12.16). There was only one maternal death among SS group. It was due to consequences of severe anemia. There was no maternal death among AS group and control group.

Thus, toxemia was alarmingly high among women with sickle cell trait and hence found to be more deleterious than previously thought. High incidence of LBW babies was due to fetal hypoxia throughout the pregnancy caused by anemia and fetoplacental insufficiency.

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