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A COMPARATIVE STUDY ON SICKLE CELL DISEASE (SCD) AND TRAIT (SCT) ITS EFFECT ON PREGNANCY OUTCOME IN VADODARA DISTRICT

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ABSTRACT

SCD and SCT is a condition which oxygen-carrying protein haemoglobin cell change in shape so it effect on oxygen carrying capacity of RBC cell. Directly affected on pregnancy outcome. Tribal belt of eastern Gujarat is affected so poor pregnancy outcome leads to maternal and neonatal Morbidity & Mortality. A comparatives study was conducted in the department of Obstetrical and Gynaecological Nursing, Sumandeep nursing college, Dhiraj Hospital, SBKSMI & RC, Vadodara. In order to achieve the objective of the study Comparative observational Non Randomised Control Trial design was adopted. 1000 pregnant women screening for SCT& SCD. Purposive sampling technique was used to collect the data from 382 participants with SCD-117 & SCT - 265.

Keyword: SCD- Sickle-cell disease, sickle-cell anaemia SCA, SCT- sickle-cell treait

INTRODUCTION

Sickle-cell disease (SCD) is a group of blood disorders typically inherited from a person's parents. The most common type is known as sickle-cell anaemia (SCA) **[1-3]**. It results in an abnormality in the oxygen-carrying protein haemoglobin (haemoglobin S) found in red blood cells**[4-7]**. This leads to a

rigid, sickle-like shape under certain circumstances. Problems in sickle cell disease typically begin around 5 to 6 months of age. A number of health problems may develop, such as attacks of pain, anaemia, swelling in the hands and feet, bacterial infections, and stroke **[8-29]**.

In Gujarat to incorporate Sickle cell anaemia control programme in the existing health services of State Government South Gujarat viz. **Surat, Tapi, Navsari, Valsad and Dang Bharuch, Narmada, Vadodara, Panchmahal, Dahod, Sabarkantha and Banaskantha, Ahmedabad**. Thus the entire tribal belt of eastern Gujarat was covered from Ambaji to Dang, having 8912623 population the main tribes in this area are kukna, kolcha, kothvadia, bhil, Chaudhary etc.

MATERIALS AND METHODS

A comparatives study of SCD, SCT patient and its effect on pregnancy outcome was done in the department of Obstetrical and Gynaecological Nursing, Sumandeep nursing college, Dhiraj Hospital, SBKSMI & RC, Vadodara. all participant included in this study underwent Maternal history number of pregnancy, Age, Height, Hb%, type of delivery, Urine R/M, Sickling states, associated antenatal complication, Mode of delivery, management of labour, Size of placenta, Post term complication, Maternal mortality including Fetal Birth weight, Term of new-born, APGHAR score, Cord blood sampling, NICU care requirement with reason and Spouse sickling test.

RESULTS

Section I: Description of samples according to their selected demographic variables:-

It describes the distribution of subjects according to age, educational qualification, occupation, family income and religion **(Table 1)**.

Section – II: Assessment of effect of sickle cell disease (SCD) and trait (SCT) on pregnancy outcome (Table 2).

Section –III: Comparison of sickle cell disease (SCD) and trait (SCT) and its effect on pregnancy outcome (**Table 3**).

In view of Management of labour, among participants with SCD (117), 60 (51.28%) participants had CS, 10(8.55%) had episiotomy, 18(15.38%) had ARM, 15 (12.82%) had Vacuum delivery, 13 (11.11%) had Forceps delivery and 01(0.85%) had Oxytocin augmentation. Among participants with SCT (265), 99 (37.36%) participants had CS, 70(26.41%) had episiotomy, 42(15.85%) had ARM, 28 (10.57%) had Vacuum delivery, 23 (8.68%) had Forceps delivery and 03(1.13%) had Oxytocin augmentation. The difference between participants with SCD & SCT found significant (p=.0043) **(Figure 1)**.

Table 5 shows that there was no significant association found between hospitalization need of new born among participants with

socio-demographic variables like education, monthly income and religion. **S**hows that there was significant association found between occupation and spouse sickling status of participants with hospitalization need of new born.

Table 1: Distribution of sample according to selected demographic variables (N=382)

S. No.	Demographic Variables	Samples					
		SCD		SCT		Total	
		f	%	f	%	f	%
	Total sample	117	30.63%	265	69.37%	382	100%
1.	Age (in years)						
a)	18-23 years	65	17.02%	147	38.48%	212	55.50%
b)	24-29 years	43	11.26%	102	26.70%	145	37.96%
c)	30-35 years	07	1.84%	13	3.40%	20	5.24%
d)	Above 35 years	02	0.51%	03	0.79%	05	1.30%
2.	Education						
a)	Illiterate	00	00%	04	1.05%	04	1.05%
b)	Primary education	68	17.80%	145	37.96%	213	55.76%
c)	Secondary education	37	9.69%	100	26.17%	137	35.86%
d)	Graduation and above	12	3.14%	16	4.19%	28	7.33%
3.	Occupation						
a)	Housewife	17	4.45%	64	16.75%	81	21.20%
b)	Agriculture	45	11.78%	114	29.84%	159	41.62%
c)	Labor	32	8.38%	51	13.35%	83	21.73%
d)	Employed	23	6.02%	36	9.43%	59	15.45%
4.	Monthly income (Rs)						
a)	Below 5000/monthly	47	12.30%	113	29.58%	160	41.88%
b)	5001-10000/ monthly	57	14.93%	129	33.77%	186	48.70%
c)	10001-20000/monthly	13	3.40%	20	5.23%	33	8.62%
d)	20001 and above	00	00%	03	0.79%	03	0.79%
5.	Religion						
a)	Hindu	75	19.63%	143	37.44%	218	57.07%
b)	Muslim	15	3.93%	35	9.16%	50	13.09%
c)	Christian	17	4.45%	48	12.56%	65	17.01%
d)	Others	10	2.62%	39	10.21%	49	12.83%
6.	Spouse sickling status						
a)	Positive	53	13.87%	98	25.65%	151	39.53%
b)	Negative	64	16.76%	167	43.72%	231	60.47%

Table 2: Assessment of effect of sickle cell disease (SCD) and trait (SCT) on pregnancy outcome (N=382)

S. No.		Samples					
		SCD		SCT		Total	
		f	%	f	%	f	%
	Total sample	117	30.63%	265	69.37%	382	100%
1.	Associated Antenatal Complications						
a)	Anaemia	05	4.27%	20	7.55%	25	6.54%
b)	Pre eclampsia/eclampsia	79	67.52%	70	26.41%	149	39.01%
c)	Oligohydramnious	14	11.97%	29	10.94%	43	11.26%
d)	Polyhydramnious	04	3.42%	18	6.79%	22	5.76%
e)	UTI	13	11.11%	33	12.45%	46	12.04%
f)	GDM	00	00	05	1.89%	05	1.31%
g)	Hyperemesis gravidrum	00	00	03	1.13%	03	0.79%
i)	No complications	02	1.71%	87	32.83%	89	23.30%
2.	BT requirement						
a)	Yes	66	56.41%	88	33.21%	154	40.31%
b)	No	51	43.59%	177	66.79%	228	59.69%
3.	No of PCV	66		88		154	
a)	1	43	65.15%	52	59.10%	95	61.69%
b)	2	16	24.24%	21	23.86%	37	24.03%
c)	3	03	4.55%	07	7.95%	10	6.49%
d)	4	04	6.06%	08	9.09%	12	7.79%
4.	Delivery type						
a)	Vaginal	57	48.72%	166	62.64%	223	58.37%
b)	LSCS	49	41.88%	96	36.23%	145	37.96%

c)	Emergency LSCS	11	9.40%	03	1.13%	14	3.67%
5.	Management of labour						
a)	ARM	18	15.38%	42	15.85%	60	15.71%
b)	Oxytocin augmentation	01	0.85%	03	1.13%	04	1.05%
c)	CS	60	51.28%	99	37.36%	159	41.62%
d)	Episiotomy	10	8.55%	70	26.41%	80	20.94%
e)	Forceps delivery	13	11.11%	23	8.68%	36	9.42%
f)	Vacuum delivery	15	12.82%	28	10.57%	43	11.26%
6.	Postpartum Complications						
	1^0 Perineal Tear						
a)	GDM	24	20.51%	00	00%	24	6.28%
b)	Gestational HTN	15	12.82%	33	12.45%	48	12.57%
c)	UTI	29	24.79%	67	25.28%	96	25.13%
d)	Wound Complications	01	0.85%	00	00%	01	0.26%
e)	Leg cramps	31	26.50%	22	8.30%	53	13.87%
f)	No complications	04	3.42%	00	00	04	1.05%
g)		13	11.11%	143	53.96%	156	40.84%
7.	Maternal Mortality						
a)	Yes	01	0.85%	00	00%	01	0.26%%
b)	No	116	17.80%	265	100%	381	99.74%
8.	Fetal Outcome						
a)	Normal Newborn	49	41.88%	200	75.47%	249	65.18%
b)	LBW	65	55.55%	60	22.64%	125	32.72%
c)	Neonatal death	02	1.70%	02	0.75%	04	1.05%
d)	Still Birth	01	0.85%	02	0.75%	03	0.79%
e)	IUD	00	00	01	0.38%	01	0.26%
9.	Term of newborn						
a)	Full term	84	71.79%	245	92.45%	329	86.13%
b)	Pre term	33	28.21%	20	7.55%	53	13.87%
10.	New born hospitalization						
a)	Yes	68	58.12%	29	10.94%	97	1.05%
b)	No	49	41.88%	236	89.06%	285	55.76%
11.	Reason NB for hospitalization						
	Anaemia						
a)	Birth Asphaxia/ Resp. Distress	04	3.41%	06	2.26%	10	2.62%
b)	LBW	01	0.85%	03	1.13%	04	1.05%
	Hyperbilirubinaemia						
c)	MSA	51	43.59%	19	7.17%	70	18.32%
d)	Pre term	06	5.13%	06	2.26%	12	3.41%
e)	IUGR	04	3.42%	00	00%	04	1.05%
f)	Labor complications	02	1.71%	03	1.13%	05	1.31%
g)		02	1.71%	02	0.75%	04	1.05%
h)		00	00	01	0.38%	01	0.26%

Table 3: Comparison between sickle cell disease (SCD) and trait (SCT) samples in terms of Associated Antenatal Complication

Variables	Samples					
Associated Antenatal Complication	SCD		SCT		Chi-$\chi 2$	Signi-ficance
	f	%	f	%		
Total sample	117	30.63%	265	69.37%		
Anaemia	05	4.27%	20	7.55%		
Pre eclampsia/eclampsia	79	67.52%	70	26.41%		
Oligohydramnious	14	11.97%	29	10.94%	75.562	S**
Polyhydramnious	04	3.42%	18	6.79%		(p=.00001)
UTI	13	11.11%	33	12.45%		
GDM	00	00	05	1.89%		
Hyperemesis gravidrum	00	00	03	1.13%		
No complications	02	1.71%	87	32.83%		

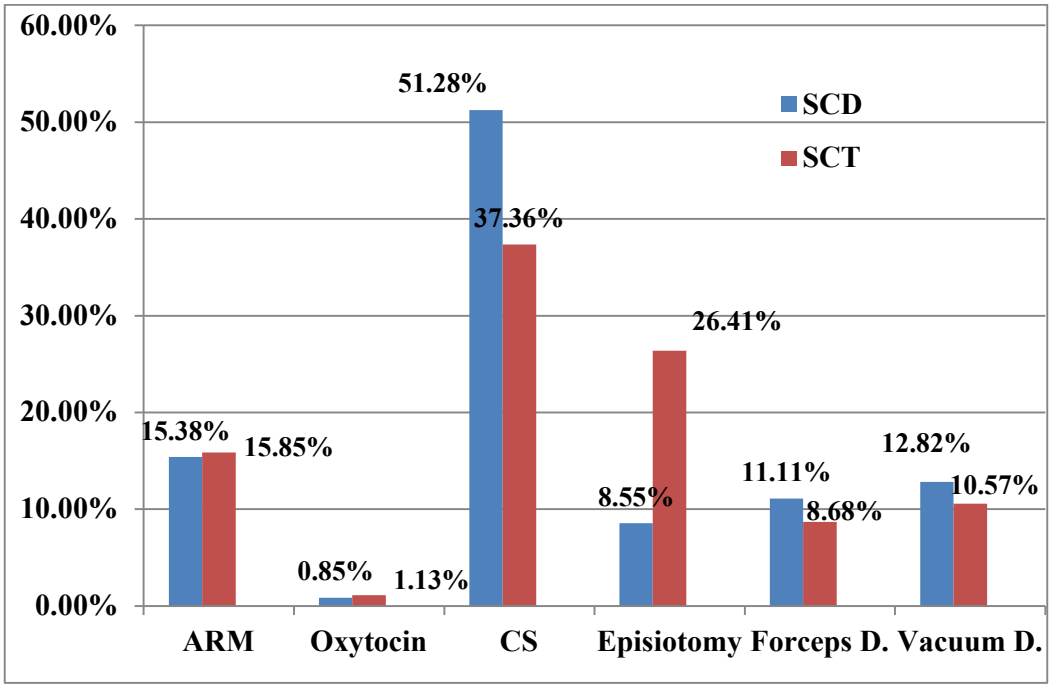

Figure 1: Comparison between sickle cell disease (SCD) and trait (SCT) samples in terms of management of labour

Table 4: Comparison between sickle cell disease (SCD) and trait (SCT) samples in terms of Postpartum Complications

Variables	Samples					
Postpartum Complications	SCD		SCT		Chi-$\chi 2$	Significance
	f	%	f	%		
Total sample	117		265			
1^0 Perineal Tear	24	20.51%	00	00%		
Gestational DM	15	12.82%	33	12.45%		
Gestational HTN	29	24.79%	67	25.28%		
UTI	01	0.85%	00	00%		S**
Wound Complications	31	26.50%	22	8.30%	114.2950	(p=.00001
Leg cramps	04	3.42%	00	00		
No complications	13	11.11%	143	53.96%		

Table 5: Associations between hospitalization need of newborn among participants with socio- demographic variables

S. No.	Demographic Variables		Hospitalization need of newborn		X^2	Table Value	Level of significance
		Freq.	Yes	No			
1.	Education						
a)	Illiterate	04	02	02			
b)	Primary education	213	58	155	3.7074	7.82	NS
c)	Secondary education	137	029	108			
d)	Graduation and above	28	08	20			
2.	Occupation						
a)	Housewife	81	20	61			
b)	Agriculture	159	37	122	9.3335	7.82	S
c)	Labor	83	28	55			(P-0.025)
d)	Employed	59	12	47			
3.	Monthly income (Rs.)						
	<5000/ Rs.						
a)	5001-10000/ Rs.	160	46	114	2.5747	7.82	NS
b)	10001-20000/ Rs.	186	46	140			
c)	> 20001 Rs.	33	05	28			
d)		03	00	03			
4.	Religion						
a)	Hindu	218	61	157			
b)	Muslim	50	15	35	3.6201	7.82	NS

c)	Christian	65	11	54			
d)	Others	49	10	39			
5.	Spouse sickling status						
a)	Positive	151	47	104	4.2992	3.84	S
b)	Negative	231	50	181			(P-0.038)

Table 6: Associations between fetal outcome among participants with socio-demographic variables

S. No.	Demographic Variables		Fetal outcome			X^2	Table Value	Level of significance
		Freq.	Normal	LBW	SB/ND/IUD			
1.	Education							
a)	Illiterate	04	02	02	00			
b)	Primary education	213	130	76	07	5.2012	12.59	NS
c)	Secondary education	137	98	38	01			
d)	Graduation and above	28	19	09	00			
2.	Occupation							
a)	Housewife	81	54	24	03			
b)	Agriculture	159	108	50	01	8.7836	12.59	NS
c)	Labor	83	47	33	03			
d)	Employed	59	40	18	01			
3.	Monthly income (Rs.)							
a)	<5000/ Rs.	160	99	54	07			
b)	5001-10000/Rs. 10001-	186	124	61	01	7.2274	12.59	NS
c)	20000/ Rs.	33	24	09	00			
d)	> 20001 Rs.	03	02	01	00			
4.								
a)	Religion	218	144	66	08			
b)	Hindu	50	36	14	00	9.0915	12.59	NS
c)	Muslim	65	41	24	00			
d)	Christian	49	28	21	00			
	Others							
5.	Spouse sickling status							
a)	Positive	151	95	54	02	1.5908	5.99	NS
b)	Negative	231	154	71	06			

Findings regarding comparison of sickle cell disease (SCD) and trait (SCT) and its effect on pregnancy outcome among participants.

Comparison of Associated Antenatal Complications

Comparison of Associated Antenatal Complication revealed that, among participants with SCD (117), 79 (67.52%) participants were having Pre eclampsia/eclampsia, 14(11.97%) were suffering from Oligohydramnious, 13 (11.11%) were suffering from UTI, 05 (4.27%) were diagnosed with anaemia, 04 (3.42%) were suffering from Polyhydramnious and only 2(1.71%) had no complications during their antenatal period. Among participants with SCT (265), 70 (26.41%) participants were having Pre eclampsia/eclampsia, 33 (12.45%) were suffering from UTI, 29(10.94%) were suffering from Oligohydramnious, 20 (7.55%) were diagnosed with anaemia, 18 (6.79%) were suffering from Polyhydramnious, 05 (1.89%) were diagnosed with GDM, 03(1.13%) were

suffering from Hyperemesis gravidrum and 87 (32.83%) had no complications during their antenatal period.

On the basis of above findings, it is affirmed that in SCT participants there were more participants (32.83%) with no complications while compared to SCD participants (1.71%). More participants with SCD (67.52%) having Pre eclampsia/eclampsia compared to SCD participants (26.41%). The difference between participants with SCD & SCT found significant (p=.00001).

Comparison of Blood transfusion (BT) requirement during pregnancy

While considering Blood transfusion (BT) requirement during pregnancy among participants with SCD (117), 66 (56.41%) participants required BT while 51 (43.59%) participants did not require BT during pregnancy. Among participants with SCT (265), 88 (33.21%) participants required BT while 177 (66.79%) participants did not require BT during pregnancy.

As per above description more participants with SCD (56.41%) required BT during pregnancy compared to SCD participants (33.21%). The difference between participants with SCD & SCT found significant (p=.0005).

Comparison of No. of Packed Cell Volume of blood (PCV) requirement

While considering no. of PCV, among participants with SCD (66), 43 (65.15%) required 1 unit PCV, 16 (24.24%) required 2 unit PCV, 03 (4.55%) required 3 unit PCV, 04(6.06%) required 4 unit PCV. Among participants with SCT (88), 52 (59.10%) required 1 unit PCV, 21 (23.86%) required 2 unit PCV, 07 (7.95%) required 3 unit PCV, 08(9.09%) required 4 unit PCV.

No significant comparison was made on the basis of No. of Packed Cell Volume of blood (PCV) requirement during pregnancy. The difference between participants with SCD & SCT found not significant.

Comparison on type of delivery

Among participants with SCD (117), 57 (48.72%) participants had vaginal delivery, 49 (41.88%) had LSCS and 11 (9.40%) had emergency LSCS. Among participants with SCT (265), 166 (62.64%) participants had vaginal delivery, 96 (36.23%) had LSCS and 03 (1.14%) had emergency LSCS.

There were more vaginal delivery in participants with SCT (62.64%) comparing to SCD (48.72%). More LSCS (41.88%) and Emergency LSCS (9.40%) was done in participant with SCD comparing to participants with SCT (36.23% LSCS & 1.13% Emergency LSCS). The difference between participants with SCD & SCT found significant (p=.00007).

Comparison on management of labour participants

In view of Management of labour, among participants with SCD (117), 60 (51.28%) participants had **Caesarean Section (**CS), 10(8.55%) had episiotomy, 18(15.38%) had ARM, 15 (12.82%) had Vacuum delivery, 13 (11.11%) had Forceps delivery and 01(0.85%) had Oxytocin augmentation. Among participants with SCT (265), 99 (37.36%) participants had CS, 70(26.41%) had episiotomy, 42(15.85%) had ARM, 28 (10.57%) had Vacuum delivery, 23 (8.68%) had Forceps delivery and 03(1.13%) had Oxytocin augmentation

There were More CS (51.28%), Forceps delivery (11.11%), Vacuum delivery (12.82%) in participants with SCD while comparing to participants with SCT (CS (37.36%), Forceps delivery (8.68%), Vacuum delivery (10.57%)). There were more episiotomy in participants with SCT (26.41%) while comparing to participants with SCD (8.55%). The difference between participants with SCD & SCT found significant (p=.0043).

Comparison of Postpartum Complications

In connection with Postpartum Complications, among participants with SCD (117), 13 (11.11%) participants had no post partum complications, 29 (24.79%) had Gestational HTN, 31(26.50%) had Wound Complications, 15 (12.82%) had Gestational DM, 24 (20.51%) had 1^0 Perineal Tear, 04(3.42%) had leg cramps and only 01(0.85%) had UTI. Among participants with SCT (265), 143 (53.56%) participants had no post partum complications, 67 (25.28%) had Gestational HTN, 22(8.30%) had Wound Complications and 33 (12.45%) had Gestational DM.

On the basis of above findings, it is affirmed that in SCT participants, there were more participants (53.96%) with no Postpartum complications while compared to SCD participants (11.11%). More SCD participants had 1^0 Perineal Tear (20.51%) and wound complications (26.50%) compared to in SCT participants (Perineal Tear (00%) and wound complications (8.30%). The difference between participants with SCD & SCT found significant (p=.00001).

Comparison in terms of Fetal Outcome

According to Fetal Outcome, among participants with SCD (117), 49 (41.88%) had normal newborn, 65(55.55%) had LBW, 02(1.70%) had neonatal death, 01(0.85%) had still birth. Among participants with SCT (265), 200 (75.47%) had normal newborn, 60(22.64%) had LBW, 02(0.75%) had neonatal death, 02(0.75%) had still birth and 01(0.38%) had IUD.

As per above findings more participants with SCT (75.47%) had normal newborn comparing to participants with SCD (41.88%). More participants with SCD

(1.70%) had neonatal death comparing to participants with SCT (0.75%). There were approximately similar still birth in both groups while participants with SCT (0.38%) had IUD comparing to participants with SCT (00%). The difference between participants with SCD & SCT found significant (p=.00001).

Comparison in terms of term of newborn

According to term of newborn, among participants with SCD (117), 84(71.79%) had full term newborn while 33(28.21%) had preterm newborn. Among participants with SCT (265), 245(92.45%) had full term newborn while 20(7.55%) had preterm newborn.

As per above findings more participants with SCT (92.45%) had full term newborn comparing to participants with SCD (71.79%). More participants with SCD (28.21%) had preterm newborn comparing to participants with SCT (7.55%). The difference between participants with SCD & SCT found significant (p=.00001).

Comparison in terms of Newborn hospitalization

On the basis of Newborn hospitalization, among participants with SCD (117), 49 (41.88%) had no hospitalization while 68(58.12%) had hospitalization. Among participants with SCT (265), 236(89.06%) had no hospitalization while 29(10.94%) had hospitalization.

As per above findings more participants with SCD (58.12%) had newborn hospitalization comparing to participants with SCT (10.94%). The difference between participants with SCD & SCT found significant (p=.0001).

Comparison in terms of Reason for newborn hospitalization

Regarding reason for newborn hospitalization, among participants with SCD, 51(43.59%) had LBW, 06(5.13%) had Hyperbilirubinaemia, 04(3.41%) had anaemia, 02 (1.71%) had preterm, 04(3.42%) had MSA, 02(1.71%) had IUGR, 01(0.85%) had Birth Asphaxia/ Resp. Distress. Among participants with SCT, 19(7.17%) had LBW, 06(2.2613%) had Hyperbilirubinaemia, 06(2.26%) had anaemia, 03 (1.13%) had preterm, 02(0.75%) had IUGR, 03(1.13%) had Birth Asphaxia/ Resp. Distress**.**

On the basis of above findings, in the participants with SCD, LBW (43.59%), Anaemia (3.41%), Hyperbilirubinaemia (5.13%), MSA (3.42%) were Reason for newborn hospitalization while compared to participants with SCT (LBW (7.17%), Anaemia (2.26%), Hyperbilirubinaemia (2.26%), MSA (00%). The difference between participants with SCD & SCT found significant (p=.049).

CONCLUSION

The present study was conducted to assess the comparison between participants with SCD and SCT on pregnancy outcome .In order to achieve the objective of the study Comparative observational Non Randomised Control Trial design was adopted. 1000 pregnant women screening for SCT& SCD.

There were poor pregnancy outcome in the participants with SCD while compared to participants with SCT in terms of Associated Antenatal Complications, BT requirement during pregnancy, type of delivery, management of labour, Postpartum Complications, Fetal Outcome, term of newborn and Newborn hospitalization. Our study result also indicates that there was significant difference between participants with SCD & SCT regarding pregnancy outcome.

It was also found that BT requirement during pregnancy and fetal outcome not associated with any socio-demographic variables. Occupation was associated with type of delivery and need of hospitalization. Thus it can be inferred that there is no significant association between pregnancy outcome parameters with majority of demographic variables.

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