Doi: 10.32677/IJCH.2017.v04.i03.032

Original Article

Effect of cesarean section on perinatal outcome: A case-control study

S K Sreenivas, K Anjana Murthy, T Renuka

From Department of Pediatrics, Bangalore Medical College and Research Institute, Bengaluru, Karnataka, India

Correspondence to: Dr. S K Sreenivas, Department of Pediatrics, Bangalore Medical College Research Institute, Bengaluru - 560 002, Karnataka, India. Phone: +91-9986551735. E-mail: sreenivaraj2007@gmail.com

Received – 03 May 2017 Initial Review – 30 May 2017 Published Online – 05 July 2017

ABSTRACT

Background: Cesarean section is the surgical intervention which has been saving lives for a long period of time. Despite its importance, there are not many studies on maternal morbidity and mortality with perinatal outcome in patients undergoing elective or emergency cesarean section. **Objective:** To find out the effect of emergency and an elective cesarean section on maternal and neonatal outcome. **Methods:** This prospective unmatched case-control study was conducted from July 2012 to June 2013 in the Department of Obstetrics and Gynaecology and Pediatrics of a Medical College of Bengaluru. 300 patients (1:1) along with their babies were selected as per the inclusion and exclusion criteria by simple consecutive sampling after written informed consent. Examination of the patient was done, and all relevant data were obtained, and results were statistically analyzed by SPSS version 24 and Microsoft Office 2016. **Results:** Maternal complications (both intra- and post-operative) were more in the emergency cesarean section group than in elective cesarean section ($p<0.001$). Neonatal complications were more common in emergency cesarean section group than in elective cesarean section ($p<0.05$). **Conclusion:** Emergency cesarean section causes more morbidity among pregnant women and their babies, which can be reduced by combined efforts at all levels and by encouraging hospital vaginal deliveries of all the primigravida, grand multiparous pregnant women and those who had a previous cesarean section, provided adequate fetal monitoring and operative facilities are available.

Key words: *Cesarean section, Complications, Elective, Emergency, Perinatal*

Cesarean section or cesarean delivery is defined as the birth of a fetus through incisions in the abdominal wall (laparotomy) and the uterine wall (hysterotomy) [1,2]. Cesarean section can be considered as one the earliest forms of modern birth technology which has become an accepted standard procedure among the modern obstetric procedures reducing maternal morbidity and mortality [3]. All over the world, cesarean section birth rates are rising and in some countries, like Brazil or Taiwan, cesarean birth rates are skyrocketing up to 60% [4,5]. This raises the question about what factors play a role in rising cesarean section rates and these differences [6].

In developed countries like USA, the rate of cesarean delivery is decreasing, in large part, due to increased vaginal birth after prior cesarean (VBAC) and to a lesser extent, a small decrease in primary cesarean rate. A study by WHO, which reviewed 110,000 births from nine countries in Asia during 2007-2008, 27% births were by cesarean section [7]. According to the WHO, the cesarean section should be restricted to 10-15% in developing countries to have a healthy maternal and infant environment [8]. However, in India, the incidence of cesarean section is as high as 30% and tends to become the norm [9,10]. In some cases, cesarean section was because of the lack of patience on the part of the patient or her physician [11].

According to the American College of Obstetrics and Gynaecologists (ACOG), the highest variation occurs among nulliparous women with term singleton fetuses with cephalic presentation and without other complications. High-risk patients have much lower variation in cesarean delivery rates between practitioners and hospitals. The maternal and fetal morbidity and mortality varies according to the type of cesarean section done and is more in the emergency cesarean section [11]. The ACOG task force on cesarean delivery recommended that "when feasible, obstetric practitioners should delay the administration of epidural anesthesia in nulliparous women until the cervical dilatation reaches at least 4-5 cm." This recommendation was based on earlier studies, which suggested that epidural analgesia increased the risk of cesarean delivery by as much as 12-fold [12].

With the growing emphasis on the antenatal and intrapartum status of the fetus and with the addition of laboratory status and technical progress of internal fetal monitoring, an increased rate of cesarean section should be expected. There must be an optimal rate of cesarean section in which the maternal risks are in the balance with the benefits of the fetus [13]. Despite its importance, there are not many studies on maternal morbidity and mortality with perinatal outcome in patients undergoing elective or emergency cesarean section, especially from our region. Therefore, we planned this study to find out the effect of emergency and an elective cesarean section on maternal and neonatal outcome.

MATERIAL AND METHODS

This prospective, unmatched, case-control study was conducted in the Department of Obstetrics and Gynaecology and Pediatrics of a teaching institution of Bengaluru. The study was conducted over a period of 1 year, i.e., from July 2012 to June 2013 after taking prior approval from the Institution Ethics Committee. Total 300 patients undergoing cesarean section (both elective and emergency) along with their newborns were enrolled in the study after detailing the study procedure in the local language and receiving the written informed consent from them. Out of 300 patients, 150 consecutive patients from elective group and 150 consecutive patients from emergency group were enrolled for the study after satisfying the inclusion and exclusion criteria (Fig. 1). Inclusion criteria of cases were patients undergoing emergency cesarean section along with their babies, and that of controls were patients undergoing elective cesarean section along with their babies. Patients who had undergone normal or assisted vaginal delivery and those who had undergone VBAC were excluded from both groups. Three patients from each group had twin babies. Hence, total 300 patients and 306 newborns were registered in the outpatient department (OPD) and/or In-PD of our hospital. The patients, who had visited the antenatal clinic for 3 times or more were termed as booked cases and rest all were termed as unbooked cases.

Detailed histories, examinations, and relevant laboratory tests were done as per our institution protocol in free of cost to all the enrolled patients, and their babies and all the relevant data were obtained. Details of indications for cesarean section, nature of operation, condition of the mother and the perinatal outcome were assessed for post-operative period of 7 days or discharge whichever is earlier. Neonates having any complications were admitted in neonatal intensive care unit (NICU) under the department of pediatrics. All the neonates were managed as per the standard hospital protocols. Details of all the neonates delivered to study subjects were collected including gestational age, birth weight, APGAR score, indications of NICU admission, duration of hospital stay, and final outcome. All the data obtained from the study participants were encrypted in the Microsoft Excel format and analyzed with SPSS version 24 (IBM Corporation, Armonk, New York, USA), and Dxt (BRTC, Vellore) software.

Descriptive and inferential statistical analysis has been performed in this study. Results on continuous measurements are presented on the mean±standard deviation (min-max), and results on categorical measurements are presented in number (%). Significance is assessed at 5% level, t-test (two-tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups. Chi-square/Fisher exact test has been used to find the significance of study parameters on a categorical scale between two groups. Odds ratio and relative risk with 95% confidence interval (CI) were calculated to estimate the risk measure.

RESULTS

Descriptive statistics are given in Table 1 as per which maximum patients are undergoing lower segment cesarean section (LSCS) belongs to age group of 18-24 years of age (62.7% in cases and 49.3% in controls), and the association is statistically significant (χ^2=18.326, p=0.028). Emergency CS was more among unbooked cases (23.3%) as compared to booked ones (7.3%) which were statistically significant (χ^2=13.267, p=0.001). There was no significant association between cases and controls with respect to gestational age in weeks (χ^2=0.0732, p=0.258). Mean body mass index (BMI) (kg/m^2) in cases was 25.89±6.26 as compared to controls 26.73±4.18 which was statistically significant (t (149,1)=25.18, p=0.001). The most common indication for LSCS in cases was fetal distress (37.3%) followed by previous LSCS accounting for 24% whereas in controls, 44% accounting for previous LSCS and cephalopelvic disproportion (CPD) ranked second (30%).

PPH was the most frequent intraoperative complication followed by uterine angle extended with bleeding was the 2nd common complication in cases. Sepsis was the most common neonatal complication (13.7%) in cases followed by hyperbilirubinemia (8.5%) whereas in controls hyperbilirubinemia was the most common complication (8.5%) followed by neonatal sepsis (5.2%). The odds of developing intraoperative complications were 5 times more in cases as compared to controls (χ^2=26.30; p=0.001; OR=4.78; 95% CI: 2.54-8.97) (Table 2). The odds of developing post-operative complications were 10 times more in cases as compared to controls (χ^2=62.74; p<0.001; OR=9.67; 95% CI 5.70-17.60) (Table 3). The odds of developing neonatal complications were 2 times more in cases as compared to controls (χ^2=6.37; p=0.050, OR=1.66; 95% CI 1.12-2.73) (Table 4). The odds of NICU stay of newborns were 2 times more in cases as compared to controls (χ^2=9.03, p=0.002, OR=2.43; 95% CI 1.38-4.39) (Table 5).

DISCUSSIONS

Cesarean delivery rates increased with advancing maternal age (<25 years - 11.6% and ≥40 years - 43.1%) [14]. Older women were more likely to have cesarean delivery without labor (<25 years - 3.6% and ≥40 years - 21.1%) [15], which is in contrast to our study and it may be due to the early marriage of girls in our society. Antenatal care is the care of the woman during pregnancy whose primary aim is to achieve healthy mother and the healthy baby [16]. Antenatal care is the major component of integrated maternal health within the reproductive health concept [17]. Maternal and neonatal complications during the perinatal period are highly associated with non-utilization of antenatal and delivery care services and poor socioeconomic conditions of the patient. These complications were more common with unbooked than booked patients [18], which correlates with the results of our study. The relationship with cesarean birth and ANC is not to our expectation because women having full ANC are having more cesarean deliveries. This disparity could be because those women who have more complications are going for full antenatal

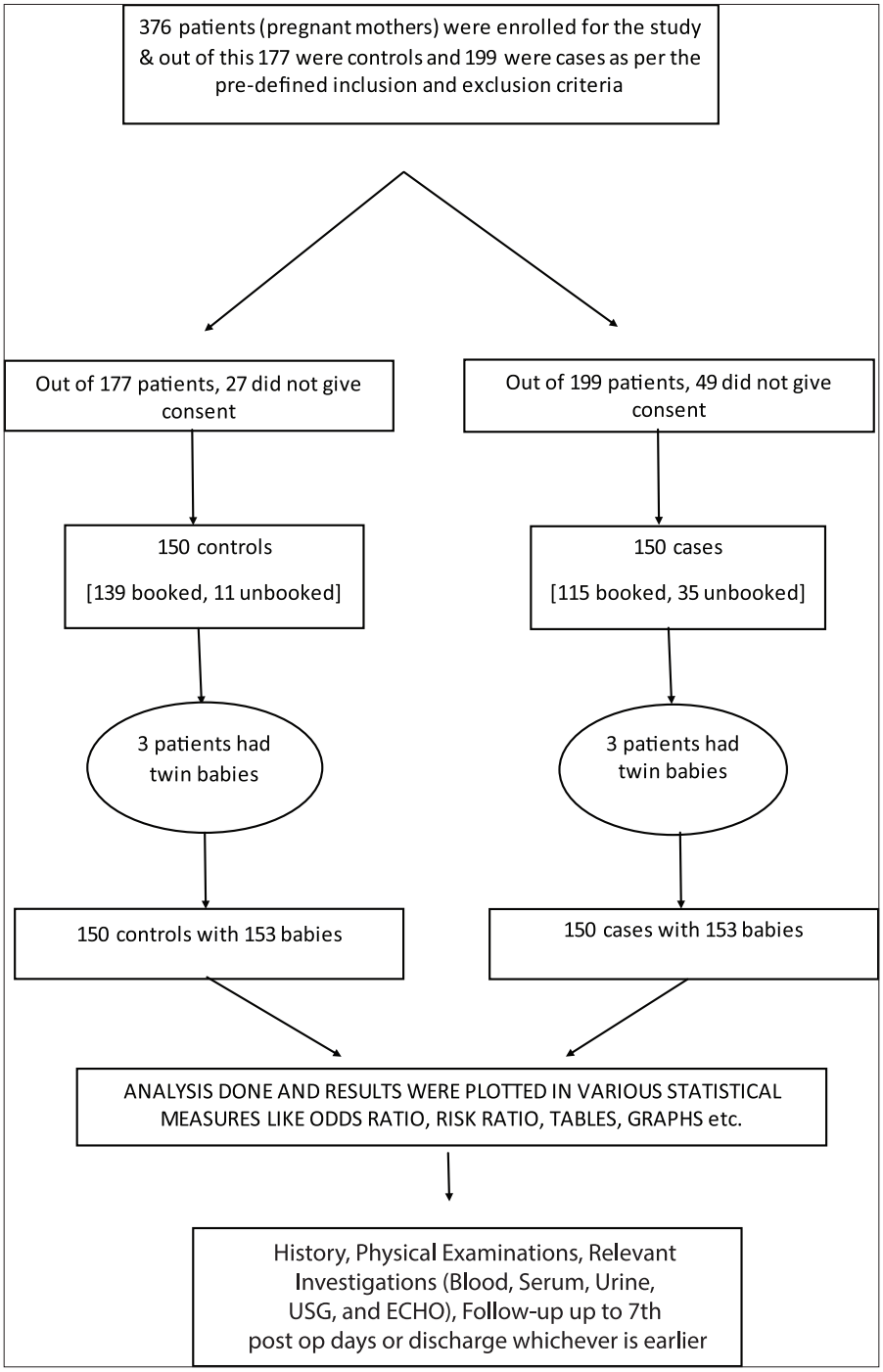

Figure 1: Study flowchart

checkups and because of the complications; these women are more vulnerable to have a cesarean birth.

The pregnancy outcomes in booked mothers are far more successful than in unbooked mothers, besides being lower in morbidity. It was due to the fact that, in India, the lower socioeconomic people are delivered at home by traditional birth attendants, lady health visitors and specialists in nursing homes. Only those patients are referred to the teaching hospital who have one or the other risk factor and who already had a trial of labor somewhere else or history of previous LSCS. Hence, the emergency cesarean sections were obviously high in these high risk and non-booked cases.

In the developing countries, there is an increase in the morbidity and iatrogenic prematurity due to elective cesarean delivery at 37-38 weeks which is associated with increased cost of admissions in the newborn special care units. Therefore, unless there is an evidence of fetal lung maturity, elective cesarean delivery should not be advised at or before 39 weeks of gestation [19]. At 39 completed weeks of gestation, elective cesarean delivery is associated with better fetal outcomes than at 37-38 weeks of completed gestation [19]. The elective cesarean delivery is usually performed at the time which is suitable for the obstetrician and the patient. Elective cesarean is usually performed at 37 weeks onward, as at this time fetus is considered to be fully

Table 1: Demographic profile of the study subjects

Parameters (n=300)	Characteristics	Cases n=150 (%)	Controls n=150 (%)
Age distribution (in years)	18-24	94 (62.7)	74 (49.3)
	25-29	44 (29.3)	56 (37.3)
	30-34	10 (6.7)	18 (12)
	≥35	2 (1.3)	2 (1.3)
Case distribution	Booked	115 (76.7)	139 (92.7)
	Un-booked	35 (23.3)	11 (7.3)
Gestational age at the time of delivery (weeks)	32-36	34 (22.7)	30 (20)
	37-39	86 (57.3)	99 (66)
	≥40	30 (20)	21 (14)
BMI (kg/m^2)	<18.5	0 (0)	0 (0)
	18.5-24.9	59 (39.3)	65 (43.3)
	25-29.9	35 (23.3)	63 (42)
	30-40	46 (30.7)	20 (13.3)
	>40	10 (6.7)	2 (1.3)
Indications	Previous LSCS	36 (24)	47 (31.3)
	Previous 2 LSCS	0 (0)	17 (11.3)
	Previous 3 LSCS	0 (0)	2 (1.3)
	CPD	5 (3.3)	45 (30)
	Fetal distress	56 (37.3)	0 (0)
	Failed induction	15 (10)	0 (0)
	Prom	13 (8.7)	0 (0)
	Breech presentation	4 (2.6)	9 (6)
	Primigravida with breech	0 (0)	3 (5.8)
	Transverse lie	1 (0.7)	1 (0.7)
	Placenta previa	2 (1.3)	0 (0)
	Antepartum hemorrhage	0 (0)	1 (0.7)
	Cord presentation	0 (0)	2 (1.3)
	Severe oligohydramnios	1 (0.7)	3 (2)
	Abruptio placenta	0 (0)	5 (3.3)
	Contracted pelvis	4 (2.7)	0 (0)
	Intrauterine growth retardation	4 (2.7)	0 (0)
	Twin gestation with non-cephalic presentation	4 (2.7)	3 (2)
	Scar tenderness	0 (0)	2 (1.3)
	Others	1 (0.7)	2 (1.3)

CPD: Cephalopelvic disproportion, LSCS: Lower segment cesarean section, BMI: Body mass index

mature. Although 37 weeks and 38-week gestation were often called "term," the babies born before 39 weeks have increased risk of breathing problems, respiratory distress and transient tachypnea of newborn and neonatal admission in NICU [20-22].

If cesarean section is delayed up to 39 weeks the risk of patients going into labor and having emergency cesarean section began to rise. Hence, the decision of time of cesarean section should be proper [23]. However in our study, there is no association between GA in weeks and types of LSCS, the cause may be due to uneducated patients and lack of staffing at peripheral centers leading to delayed referral. Women with an increased BMI are managed differently in labor than women of normal weight. This difference in management in part explains the increased rate of cesarean section observed patients with higher BMI which coincides with our study [24-27].

While the most frequent indication for the emergency cesarean section was pre-eclampsia, vaginal bleeding/abruption placentae, breech presentation, and secondary inertia of the uterus were the other indications [28]. In a study where 82.07% of the cesarean sections were performed as an emergency procedure, and 17.92% cases were elective procedures, elective repeat cesarean sections were usually performed for CPD [29]. In this study, it can be stated that the most common indication for elective cesarean section was previous LSCS, whereas, in emergency cesarean section, it was fetal distress. This discrepancy may be due to the ignorance and irregular antenna check-up on the part of the patients and due to the delayed referral. In various previous studies [30,31], a comparison of the maternal morbidity in emergency cesarean section and elective cesarean section was done and results were significantly worse

Table 2: Intraoperative complications

Intraoperative complications (n=300)	Cases n=150 (%)	Controls n=150 (%)
No	15	52
Yes	135	98
PPH	12 (8)	0.7 (1)
Uterine angle extended with bleeding	10 (6.7)	2.7 (4)
Dense adhesion	8 (5.3)	2.7 (4)
High insertion of bladder	8 (5.3)	2 (3)
Retro placental clot ≥150 ml	1 (0.7)	0 (0)
Injury to ascending branch of uterine artery	4 (2.7)	0 (0)
Scar dehiscence	2 (3)	0 (0)
Adherent bladder to LUS	1.3 (2)	0 (0)
Adhesions between rectus sheath and muscle	0.7 (1)	3 (2)
Broad ligament hematoma	0.7 (1)	0 (0)
Incision extended vertically in the LUS up to cervix	1.3 (2)	0 (0)

PPH: Post-partum hemorrhage, LUS: Lower uterine segment

Table 3: Post-operative complications

Post-operative complications (n=300)	Cases n=150 (%)	Controls n=150 (%)
No	134	70
Yes	16	80
PPH	20 (13.3)	5 (3.3)
Wound infection	14 (9.3)	2 (1.3)
UTI	10 (6.7)	2 (1.3)
Breast engorgement	6 (4)	3 (2)
Puerperal pyrexia	10 (6.7)	4 (2.7)
Respiratory tract infection	6 (4)	0 (0)
Anemia	8 (5.3)	0 (0)
Mastitis	2 (1.3)	0 (0)
Wound gaping	4 (2.7)	0 (0)

UTI: Urinary tract infection, PPH: Post-partum hemorrhage

for emergency cesarean section groups which also coincides with our present study.

More elective repeat cesarean section babies were admitted to the NICU [32,33]. Early delivery (before 39 weeks) for elective cesarean section in the United States was associated with an increase in admission to NICU [34]. The newborns delivered through cesarean section were more likely to be admitted to NICU within 28 days of birth than those delivered vaginally [35]. From the above-mentioned studies, it is clear that cesarean section deliveries are associated with longer NICU stay of the newborns. In this study also, higher NICU stay in cases (emergency cesarean section) was seen as compared to controls (elective cesarean section), which may be due to more neonatal risks associated with emergency cesarean section deliveries.

Public health education is the most important factor, and the people should realize that government has established health facilities for the common masses and they must avail the

Table 4: Neonatal complications

Neonatal complications (n=306)	Cases n=153 (%)	Controls n=153 (%)
No	107	121
Yes	46	32
Sepsis	20 (13.7)	8 (5.2)
Hyperbilirubinemia	12 (8.5)	14 (8.5)
RDS	8 (5.2)	6 (3.9)
MAS	2 (1.3)	4 (2.6)
Fever	1 (0.7)	0 (0)
Birth asphyxia	2 (1.3)	0 (0)
Death	1 (0.7)	0 (0)

RDS: Respiratory distress syndrome, MAS: Meconium aspiration syndrome

Table 5: NICU stay of newborns delivered by LSCS

NICU stay (n=306)	Cases n=153 (%)	Controls n=153 (%)
No	112 (73.2)	133 (86.9)
Yes	41 (26.8)	20 (13.1)
1-2 days	7 (4.6)	2 (1.3)
3-7 days	33 (21.6)	17 (11.1)
7-14 days	1 (0.7)	1 (0.7)
≥14 days	0 (0)	0 (0)

NICU: Neonatal intensive care unit, LSCS: Lower segment cesarean section

available facilities. Primary health providers and traditional birth attendant must be educated regarding the risks of injudicious use of oxytocics without proper assessment and the dangers of the obstructed labor. They should refer the cases a bit earlier to reduce the incidence of maternal as well fetal morbidity and mortality. Government should strengthen the existing health facilities so that antenatal and delivery services should be provided to all the pregnant women in the society and the rate of the emergency cesarean section can be reduced to a greater extent.

This study has also some limitations. As this is a case-control study, biases could not be avoided. Furthermore, the analysis is unmatched one, so confounders could not be adjusted in the design itself or in the analysis part. Furthermore, as it is a hospital based study, the results cannot be extrapolated to general population. As sample size estimation could not be done; the power of the study is hard to be determined. Hence, a multicentric cohort study with appropriate sample size is awaited in view of the importance of this research.

CONCLUSION

In our study, maternal complications (both intra- and post-operative) as well as neonatal complications were more in the emergency cesarean section group than in elective cesarean section. Emergency cesarean section rate should be reduced by combined efforts at all levels and by encouraging hospital vaginal deliveries of all the primigravida, grand multiparous pregnant women and those who had a previous cesarean section, provided adequate fetal monitoring and operative facilities are available.

REFERENCES

1. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY. Williams obstetrics. Caesarean Delivery and Peripartum Hysterectomy. 23rd ed. Ch. 25. New York: McGraw Hill; 2010. p. 544-55.
2. Definition of Caesarean Section. Midterms Medical Dictionary A-Z List. Caesarean Definition. Available from: http://www.search.medicinenet.com/search/search_results/default.aspx?Searchwhat=1andquery=c-sectionandI1=Search. [Last accessed on 2017 April 12].
3. Verdult R. Caesarean birth: Psychological aspects in adults. Int J Prenat Perinat Psychol Med. 2009;21(1):17-36.
4. Finger C. Caesarean section rates skyrocket in Brazil. Many women are opting for caesareans in the belief that it is a practical solution. Lancet. 2003;362(9324):628.
5. Kennare R. Why is the caesarean rate rising? Midwifery Dig. 2003;13(4):503-8.
6. Wagner M. Pursuing the Birth Machine; The Search for Appropriate Birth Technology. Camper Down, NSW, Australia, Sevenoaks: ACE Graphics; 1994. Available from: https://www.capitadiscovery.co.uk/dmu/items/253068. [Last accessed on 2017 April 12].
7. Sinha K. The Times of India. Featured Articles About Lancet. May, 29; 2013. p. 5. Available from: http://www.articles.timesofindia.indiatimes.com/keyword/lancet/featured/5. [Last accessed on 12 April 2017].
8. World Health Organization. Appropriate technology for birth. Lancet. 1985;2(8452):436-7.
9. Mukherjee SN. Rising caesarean section rate. J Obstet Gynecol India. 2006;56(4):298-300.
10. Odent M. The Caesarean. London: Free Associations Books; 2004.
11. American College of Obstetricians and Gynaecologists. Evaluation of Cesarean Delivery. Washington, DC: ACOG; 2000.
12. Lieberman E, Lang JM, Cohen A, D'Agostino R Jr, Datta S, Frigoletto FD Jr. Association of epidural analgesia with cesarean delivery in nulliparas. Obstet Gynecol. 1996;88(6):993-1000.
13. World Health Organization. Promoting Effective Perinatal Care: Promoting Effective Perinatal Care. Essential Antenatal, Perinatal and Postpartum Care; 2002.
14. Notzon FC, Placek PJ, Taffel SM. Comparisons of national cesarean-section rates. N Engl J Med. 1987;316(7):386-9.
15. Ecker JL, Chen KT, Cohen AP, Riley LE, Lieberman ES. Increased risk of cesarean delivery with advancing maternal age: Indications and associated factors in nulliparous women. Am J Obstet Gynecol. 2001;185(4):883-7.
16. Dolin PJ, Raviglione MC, Kochi A. Global tuberculosis incidence and mortality during 1990-2000. Bull World Health Organ. 1994;72(2):213-20.
17. Olatubosun OA. A practical guide to obstetrics in the tropics. Lancet. 2002;360:956.
18. Aamir F, Fasih A, Mahesh A, Charles EQ. A comparative review of maternal morbidity and perinatal outcome in booked and un-booked mothers. Pak J Surg. 2012;28(4):280-4.
19. Okeke TC, Onah N, Ikeako LC, Ezenyeaku CC, Nwogu-Ikojo E. Maternal and fetal outcome of elective caesarean section at 37-38 weeks versus 39 completed weeks of gestation in Enugu, Southeast Nigeria. Am J Clin Med Res. 2013;1(2):32-4.
20. Farchi S, Di Lallo D, Polo A, Franco F, Lucchini R, De Curtis M. Timing of repeat elective caeseraen section delivery and neonatal respiratory outcome. Archives of disease in childhood. Fetal Neonatal Addit. 2010;95(1):78.
21. Willmink FA, Hukkelhoven CW, Lunshof S. Neonatal outcome following elective caesarean section beyond 7 weeks of gestation: A 7 years retrospective analysis of a national registry. A J Obstet Gynaecol. 2010;202(3):251-8.
22. Oschiro BT, Henry E, Wilson J, Branch DW, Varner MW. Decreasing elective delivery before 39 weeks of gestation in an integrated health care system. Obstet Gynaecol. 2009;1130(4):804-11.
23. Dar LR, Sohail S, Rasul S. Appropriate gestational age for elective C-section. Biomedica. 2012;28:46-8.
24. Abenhaim HA, Benjamin A. Higher caesarean section rates in women with higher body mass index: Are we managing labour differently? J Obstet Gynaecol Can. 2011;33(5):443-8.
25. Dempsey JC, Ashiny Z, Qiu CF, Miller RS, Sorensen TK, Williams MA. Maternal pre-pregnancy overweight status and obesity as risk factors for cesarean delivery. J Matern Fetal Neonatal Med. 2005;17:179-85.
26. Sheiner E, Levy A, Menes TS, Silverberg D, Katz M, Mazor M. Maternal obesity as an independent risk factor for caesarean delivery. Paediatr Perinat Epidemiol. 2004;18(3):196-201.
27. Vahratian A, Siega-Riz AM, Savitz DA, Zhang J. Maternal pre-pregnancy overweight and obesity and the risk of cesarean delivery in nulliparous women. Ann Epidemiol. 2005;15(7):467-74.
28. Elvedi-Gasparovic V, Klepac-Pulanic T, Peter B. Maternal and fetal outcome in elective versus emergency caesarean section in a developing country. Coll Antropol. 2006;30:113-8.
29. Khan FA, Khan M, Ali A, Chohan U. Estimation of blood loss during caesarean section: An audit. J Pak Med Assoc. 2006;56(12):572-5.
30. van Ham MA, van Dongen PW, Mulder J. Maternal consequences of caesarean section. A retrospective study of intra-operative and postoperative maternal complications of caesarean section during a 10-year period. Eur J Obstet Gynecol Reprod Biol. 1997;74(1):1-6.
31. Raees M, Yasmeen S, Jabeen S, Utman N, Karim R. Maternal morbidity associated with emergency versus elective caesarean section. J Postgrad Med Inst. 2012;27(1):55-62.
32. Fogelson NS, Menard MK, Hulsey T, Ebeling M. Neonatal impact of elective repeat cesarean delivery at term: A Comment on patient choice cesarean delivery. Am J Obstet Gynecol. 2005;192:1433-6.
33. Kamath BD, Todd JK, Glazner JE, Lezotte D, Lynch AM. Neonatal outcomes after elective cesarean delivery. Obstet Gynecol. 2009;113(6):1231-8.
34. Tita AT, Landon MB, Spong CY, Lai Y, Leveno KJ, Varner MW, et al. Timing of elective repeat cesarean delivery at term and neonatal outcomes. N Engl J Med. 2009;360(2):111-20.
35. Fallah S, Chen XK, Lefebvre D, Kurji J, Hader J, Leeb K. Babies admitted to NICU/ICU: Province of birth and mode of delivery matter. Healthc Q. 2011;14(2):16-20.

Funding: None; Conflict of Interest: None Stated.

How to cite this article: Sreenivas SK, Murthy A, Renuka. Effect of cesarean section on perinatal outcome: A case-control study. Indian J Child Health. 2017; 4(3):409-414.