

Clinical Profile of Babies Born by Caesarean Section in Tertiary Centre

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Abstract:

Background: Cesarean section is the surgical intervention in case of serious delivery complications and has been life-saving for a long period. The current study aimed to analyze the various indications of cesarean delivery over a period of 4 years. To evaluate the maternal and fetal outcomes between elective and emergency cesarean section

Methods: The demographic profile of the mothers was included in the study which included maternal history, age, obstetric history, and indications for Caesarean section, which was recorded on the proforma. At birth, the profile of the infants including gender, birth weight, gestational age, vitals, and APGAR score was recorded in the Caesarean operation theatre. The evaluation of newborns followed the guidelines from the neonatal resuscitation program. The neonates who did not need medical intervention were transferred for standard maternal care along with early breastfeeding initiation but those needing resuscitation received instant treatment.

Results: Emergency CS had lower mean APGAR scores (1st min: 7.87±2.10, 5th min: 8.51±2.12) than elective CS (1st min: 8.21±1.42, 5th min: 8.86±1.39). Most babies (72.03%) weighed 2.5-3.499 kg. Gestational age was mainly 37-42 weeks (71.05%). Primigravida mothers were the majority (41.5%), with most aged 21-25 (52.8%). Emergency CS (80.26%) was more common than elective CS (19.74%). The male-to-female ratio was 1.05:1. Neonatal complications were higher in emergency CS (14.76%) than in elective CS (7.9%) (P<0.01). Mean birth weights and gender distribution showed no statistical difference.

Conclusion: The incidence of cesarean sections was 26.46%. The incidence of emergency CS was 80.26%, compared with 19.74% for elective CS. The sex distribution of babies born through the cesarean section was found to be almost equally distributed among male and female neonates. The majority of the babies were full-term and weighed between 2.500 – 3.499 kgs. The majority of mothers were primigravidas and between 21-25 years of age. Fetal distress was the most common indication for emergency CS and 'previous LSCS' in elective CS cases.

Keywords: Emergency cesarean sections, Elective cesarean section (CS), Neonatal outcome, APGAR scores.

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Introduction

Cesarean section (CS) is a surgical procedure used to deliver one or more babies. CS is usually performed when

vaginal delivery puts the mother's or child's health or life at risk. In recent years, the number of CS has risen worldwide. [1]

Since CS also involves the risk of adverse outcomes for both mother and child, concerns have been expressed regarding its increased use. The incidence of LSCS in different parts of the world is 46% in China and $\geq 25\%$ in many Asian, European, and Latin American countries. The World Health Organization (WHO) recommends an optimal rate of 15%. [2, 3] It is interesting to note that even a decade ago, only three countries had rates lower than this. [4] India has yet to establish guidelines for acceptable Caesarean section rates. Considering the usual obstetric indications, the acceptable rate seems to be 10–15 percent. [5] High-risk patients do not show a large variation in Caesarean rates, regardless of where they deliver. The largest variation occurred in the low-risk patient category, specifically the nulliparous patient with a term singleton fetus with vertex presentation without other complications. It has been shown that in this group perinatal morbidity and mortality rates are not improved by the performance of a Caesarean section. [6]

Similar studies have been, or are being, conducted in our and other countries worldwide. Thus, the results will not only elucidate possible indications for the cesarean section but also contribute to an overall comparison of indications for the cesarean section. Infants delivered via cesarean section are reported to have an increased risk of pulmonary disorders, often requiring Neonatal Intensive Care (NICU) admission. In the case of cesarean sections, the rate of respiratory death in newborns is higher. The risks include retention of fluid in the lungs if not expelled by the pressure of contractions during labor, leading to respiratory distress. Several studies have demonstrated an increase in serious morbidities associated with cesarean deliveries. The outcomes reported represented a range of severity from transient tachypnea of newborns to persistent pulmonary hypertension. [7] Among the infants delivered by cesarean section, the risk for most adverse

respiratory outcomes was two to three times that for infants born vaginally.

In a recent case-control study, Hernandez-Diaz reported a sevenfold increase in the risk for persistent pulmonary hypertension among infants delivered by cesarean section compared to those born vaginally. [8] Compared with infants who experienced a spontaneous vaginal birth, the relative risk of having birth asphyxia is still high among infants who were delivered by cesarean section during labor. Many of these cesarean sections would have been performed for urgent and emergent fetal indications such as cord prolapse, placental abruption, or concerns about fetal well-being. These facts indicate that there has been a significant increase in the incidence of LSCS, leading to increased morbidity and mortality in neonates born by LSCS. Cesarean section can be performed as an elective as well as an emergency procedure. Therefore, this study was undertaken to compare fetal outcomes and indications in elective versus emergency cesarean sections in a tertiary care center.

Material and Methods

This prospective observational study was carried out in the Department of Pediatrics/ Neonatology at a tertiary care teaching hospital. Institutional Ethical approval was obtained for the study. Written approval was obtained from the parents of the study after explaining the nature of the study in vernacular language. Those infants whose parents were voluntarily willing to participate in the study were included.

Inclusion Criteria

1. All mothers undergoing cesarean sections in our tertiary care center.
2. All neonates are born by cesarean sections in our tertiary care center.

Exclusion Criteria

1. Neonates born by vaginal delivery
2. Those not willing to participate in the study.

The demographic profile of the mothers was included in the study which included maternal history, age, obstetric history, and indications for Caesarean section, which was recorded on the proforma. At birth, the profile of the infants including gender, birth weight, gestational age, vitals, and APGAR score was recorded in the Caesarean operation theatre. The evaluation of newborns followed the guidelines from the neonatal resuscitation program. The neonates who did not need medical intervention were transferred for standard maternal care along with early breastfeeding initiation but those needing resuscitation received instant treatment. NICU staff received neonates needing intensive care for assessment which included tests for vital signs and CBC together with ABG and blood cultures and CRP with mode of oxygen delivery and admission reason documentation.

Upon admission to the NICU, the baby's weight, length, head circumference, and temperature were recorded, and written consent was obtained from the guardian. Routine care, including cord care, eye care, daily sponging, temperature stabilization, and vitamin K administration, was provided. A detailed antenatal history, including maternal factors, birth history, cesarean indications, and resuscitation needs, was documented. A thorough clinical examination of the cardiovascular, respiratory, abdominal, and neurological systems was conducted, and maturity was assessed using the New Ballard scoring system [9]. Respiratory distress was graded using Downe's score [10], and management followed standard protocols. Parameters such as APGAR score, axillary temperature, perfusion, skin color, heart rate, respiratory rate, oxygen saturation, blood sugar levels, head circumference,

systemic examination, complete blood count, arterial blood gas analysis, blood cultures, CRP, chest X-rays, and 2D echo were studied as needed. The clinical examination was used to determine treatment methods for complicated newborns who received oxygen through CPAP systems and hood devices or mechanical ventilation. Whether cases required the increase of CPAP pressure from 5 cm water to 8 cm or not, mechanical ventilation served as the backup when CPAP failed or when respiratory distress was severe. The required treatment consisted of intravenous fluids coupled with antibiotics temperature control and blood transfusions in addition to the use of inotropes when needed. The primary objective aimed to achieve healthcare stability through the stepwise process of moving newborns from assisted ventilation to CPAP and oxygen by hood before terminating all oxygen treatment.

Statistical analysis: All the available data was uploaded to an MS Excel spreadsheet and analyzed by SPSS version 22 in Windows format. The continuous variables were represented as mean, standard deviation, and percentage. The categorical variables were calculated using Pearson's Chi-square test for differences between the two groups. The values of p (<0.05) were considered as significant.

Results

During our study period, we found that the total number of deliveries was 8959, out of which 2371 were cesarean sections. Therefore, the incidence of cesarean section in our study was 26.47%. A total of 2428 babies were born out of 2371 cesarean sections during our 1-year study period, including 55 multiple pregnancies (53 twins and 2 triplets).

Table 1: Incidence of cesarean section

	Cesarean section number	Number of babies
Singleton CS	2316	2316
Twins CS	53	106
Triplets CS	2	6
Total CS	2371	2428

Of the 2371 CS, 1903 (80.26%) were emergency CS giving birth to 1950 babies and 468 (19.74%) were elective CS giving birth to 478 babies. Thus, the incidence of emergency CS was higher than that of elective CS in our study. Of 2428 (100%) babies born through cesarean section, 1241

(51.11%) were male and 1187 (48.89%) were female. So the male-to-female ratio of babies born through the cesarean section was 1.05:1. The gender distribution of cesarean babies was statistically similar in both sexes ($z=1.10$, $p>0.05$).

Table 2: Age-wise distribution of cesarean mothers

Age of mother in years	Frequency	Percentage	
≤20	567	23.91	Chi-square = 1163.6, Df=3, P <0.01
21-25	1252	52.80	
26-30	440	18.56	
>30	112	4.72	
Total	2371	100	

Of a total of the 2371 mothers who underwent cesarean section (Table 2), the majority (that is, 1252 (52.80 %) mothers were between 21-25 years of age, followed by 567 (23.91%) aged < 20 years. 440 (18.56%) mothers were aged between 26-30 years while 112 (4.72%) were older than 30 years (Table 1). 21-25 years Age group of cesarean mothers was significantly higher than that of other age groups of

cesarean mothers (Chi-square= 1163.6, Df=3, P<0.01). The mean age of mothers opting for elective CS was 24.47 ± 4.11 years and the mean age of mothers undergoing emergency CS was 23.37 ± 3.83 years. The statistical mean age of mothers opting for elective CS is significantly more than the mean age of mothers undergoing emergency CS ($t= 5.48$, $p<0.01$).

Table 3: Gravida-wise distribution of cesarean mothers

Gravida	Frequency	Percentage	Test
1	984	41.50	Chi-square = 813.90, Df=3, P<0.01
2	889	37.49	
3	368	15.52	
>3	130	5.49	
Total	2371	100	

Out of 2371 mothers who underwent cesarean section, the majority i.e. 984 (41.50%) cesarean mothers were primigravida, 889 (37.49%) cesarean mothers were second gravida, 368 (15.52%) cesarean mothers were third

gravida and 130 (5.49%) cesarean mothers were fourth and more gravida (Table 2). Statistically primi gravida mothers were statistically significantly more than any other gravida mothers (Chi-square =813.90, Df=3, P<0.01).

Table 3: Distribution of cesarean babies based on weeks of gestational age

	Emergency CS		Elective CS		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
<37wks	595	30.51	41	8.58	636	26.19
37-42wks	1316	67.49	409	85.56	1725	71.05
>42wks	39	2.00	28	5.86	67	2.76
Total	1950	100.00	478	100.00	2428	100.00

Out of 1950 babies born through emergency cesarean section 595 (30.51%) babies were below 37 weeks of gestation, 1316 (67.49%) babies were between 37-42 weeks of gestation, and 39 (2%) babies were more than 42 weeks of gestation. Out of 478 babies born through elective cesarean section, 41 (8.58%) babies were below 37 weeks of gestation, 409 (85.56%) babies were between 37-42 weeks of gestation, and 28 (5.86%) babies were more

than 42 weeks of gestation. Overall, regardless of the type of cesarean section done, out of 2428 babies, 636 (26.19%) babies were below 37 weeks of gestation, 1725 (71.05%) babies were between 37-42 weeks of gestation, and 67 (2.76%) babies were more than 42 weeks of gestation. So emergency as well as elective caesarean section incidence was higher among babies between 37-42 weeks of gestation (Table 3).

Table 4: Birth weight-wise distribution of cesarean babies

Birth weight in kgs	Frequency	Percentage	Test
<1.500	27	1.11	Chi-square =1854.59 Df=2 P<0.01
1.500-2.499	635	26.15	
2.500-3.499	1749	72.03	
>3.499	17	0.70	
Total	2428	100	

Out of 2428 cesarean babies, the majority 1749 (72.03%) weighed between 2.500-3.499 kg, 635 (26.15%) weighed between 1.5-2.499 kg, 27 (1.11%) weighed < 1.5 kg and 17 (0.7%) weighed >3.499 kg (Table 4). Statistically birth weight of babies between 2.5- 3.499kg was significantly more than other birth weight babies (Chi-

square= 1854.59, Df=2, P<0.01). The mean birth weight of babies born by emergency CS was 2.76 ± 0.42 kgs and elective CS was 2.79 ± 0.37 kgs. Statistically mean birth weights of babies born in both cesarean sections were not significant ($t=1.42$, $P>0.05$).

Table 5: APGAR score index of babies born by Emergency CS and Elective CS

	Emergency CS	Elective CS	P value
First minute APGAR index (X±SD)	7.87±2.10	8.21±1.42	t=3.32 P<0.01
Fifth minute APGAR index (X±SD)	8.51±2.12	8.86±1.39	t=3.39 P<0.01

The mean first-minute APGAR score index in emergency CS was 7.87 ± 2.10 and elective CS was 8.21 ± 1.42 . The mean fifth-minute APGAR score index in emergency CS was 8.51 ± 2.12 and elective CS was 8.86 ± 1.39 . The babies born in the

emergency cesarean section statistically had a significantly lower APGAR score index than the children born in the elective cesarean section in the first minute and in the fifth minute.

Table 6: Distribution of babies according to neonatal complications among Elective and Emergency cesarean sections.

Neonatal complications	Emergency cesarean section	Elective cesarean section	Test statistics
Present	281 (14.76%)	37 (7.90%)	Z =3.90 P<0.01
Absent	1622 (85.24%)	431 (92.10%)	
Total	1903	468	

Out of 1903 emergency CS, 281 (14.76%) were associated with neonatal complications and there were no complications in 1622 (85.24%). Out of 1903 elective CS, 37 (7.90%) were associated with neonatal complications and there were no complications in 431 (92.10%). Statistically significant neonatal complications were seen in emergency cesarean sections than in elective cesarean sections ($Z = 3.90$, $P < 0.01$) [Table 6].

Discussion

Cesarean section (CS) is a surgical procedure used to deliver one or more babies. CS is usually performed when vaginal delivery will put the mother or child's health or life at risk. The number of CS has increased worldwide in recent years. Since CS also involves the risk of adverse outcomes for both mother and child, concerns have been expressed regarding its increased use. A total of 2371 cesarean sections were performed over a period of 1 year. The maternal and neonatal indications for CS were studied. Neonates requiring NICU admission were followed up in the NICU and studied in detail. Outborn babies and neonates born via the vaginal route were excluded. The Objective was to study the incidence of cesarean section, various indications of elective and emergency cesarean sections, clinical profiles, and outcomes of babies born by cesarean section, and to compare babies born by elective and emergency cesarean section. Our study was comparable to that reported by Mittal et al. [11], where the incidence rate was 28.93%, Stavrou et al. [12] reported an incidence of CS of 29.55%, and Chong et al. [13] reported an incidence of 29.6%. The total number of deliveries was

8959, of which 2371 were cesarean sections. Therefore, the incidence of cesarean section in our study was 26.46%. Of the 2371 CS, 1903 (80.26%) were emergency CS giving birth to 1950 babies and 468 (19.74%) were elective CS giving birth to 478 babies. This indicates that the incidence of emergency CS was higher than that of elective CS in the present study. The results of our study are comparable with those of Onankpa et al. [14], where emergency CS was performed in 80.6% of cases and elective CS in 19.4% of cases. However, Moges et al. [15] found a greater number of emergency CS in 90.4% of cases and elective CS in 9.6% of cases.

Out of 2428 (100%), babies born through cesarean section, 1241 (51.11%) were males and 1187 (48.89%) were females. The sex distribution of neonates born via CS was not statistically significant ($z = 1.10$, $p > 0.05$). In a study by Onankpa et al. [14] 1371 (53.5%) patients were males and 1191 (46.5%) were females. The male-to-female ratio was 1.2:1 and was not statistically significant, which was comparable to our study. In this study, out of 2428 babies, we found 51.11% male babies compared to 48.89% females. Onankpa et al. [14] found (53.5%) patients were male and (46.5%) cases were female, which was comparable to our study. Of the 2371 mothers who underwent cesarean section, 1252 (52.80%) mothers were between 21-25 years of age, followed by 567 (23.91%) aged < 20 years. The age group of mothers 21-25 years was significantly higher than that of mothers in other age groups. In a similar study by Subhashini et al. [16] out of 2084 mothers, the majority of 1029 (49.38%) mothers were between 21-25 years of age group,

which was comparable with our study. Daniel et al. [17] found the majority of 76.97% of mothers were between 21-30 years old, which was comparable with our study. (i.e. 52.80% + 18.56% = 71.36%).

In the current study, we found primigravida in 37.49% of cases second gravida in 15.52% cases, and third gravida in 5.49% cases. Daniel et al. [17] found majority of 47.27% of mothers were primigravida, which was comparable to our study. Subhashini et al. [16] found the incidence of primigravida mothers was 37.25%, which was also comparable with our study. Overall, regardless of the type of cesarean section, out of 2428 babies, 636 (26.19%) babies were below 37 weeks of gestation, 1725 (71.05%) babies were between 37- 42 weeks of gestation, and 67 (2.76%) babies were more than 42 weeks of gestation. Therefore, emergency as well as elective caesarean section incidence was higher among babies between 37- 42 weeks of gestation. Subhashini et al. [16] most of the babies i.e. 1549 (74.32%) out of 2084 babies were full term, which is comparable with our study.

The birth weight of babies was determined and found that the majority 72.03% were between 2.5 – 3.49 Kgs, 26.15% were between 1.5 – 2.49 Kgs and 1.11% were the cases of babies weighted < 1.5 Kg and 0.7% were the cases weighed > 3.49 Kgs. Elvedi et al. [18] average birth weight of babies born by emergency CS was 3.48 ± 0.50 kgs and elective CS was 3.49 ± 0.51 kgs and the difference was also not statistically significant, which was comparable with our study. The average first-minute APGAR score index in emergency CS was 7.87 ± 2.10 and elective CS was 8.21 ± 1.42 . The average fifth-minute APGAR score index in emergency CS was 8.51 ± 2.12 and elective CS was 8.86 ± 1.39 . The babies born in the emergency cesarean section statistically had a significantly lower APGAR score index than the children born in the elective cesarean section in the first minute and in the fifth minute. Out of 1903

emergency CS, 281 (14.76%) were associated with neonatal complications and there were no complications in 1622 (85.24%). Out of 1903 elective CS, 37 (7.90%) were associated with neonatal complications and there were no complications in 431 (92.10%). Similar results were observed in a study done by Daniel et al. [17] there were more significant neonatal complications in emergency cesarean sections than in elective cesarean sections, which was comparable with our studies. In Emergency CS, out of 1903, 1622 (85.23%) were given to mothers, 223 (11.72%) were needed NICU admission, 4 (0.21%) were still births and 54 (2.84%) were IUD. In Elective CS, out of 468, 431 (92.09%) were given to the mother, 34 (7.26%) were needed NICU admission, and 3 (0.64%) were IUD. There were no stillbirths. The overall NICU admissions were 258 among 2371 cesarean sections resulting in a 10.84% NICU admission rate. Similar results were observed in a study done by Santhanalakshmi et al. [19] NICU admission rate among all cesarean sections was 10.1%, which means most of the neonatal outcome was 'given to mother', which was also comparable with our studies.

Conclusion

Within the limitations of the current study, we found that the incidence of cesarean sections was 26.46%. The incidence of emergency CS was 80.26%, compared with 19.74% for elective CS. The sex distribution of babies born through the cesarean section was almost equally distributed among male and female neonates. The majority of the babies were full-term and weighed between 2.500 – 3.499 kgs. The majority of mothers were primigravidas and between 21-25 years of age. Fetal distress was the most common indication for emergency CS and 'previous LSCS' in elective CS cases. The average age of the mothers undergoing elective CS was higher than that of the mothers

undergoing emergency CS. Apgar score index was lower in emergency CS compared to elective CS. Less fetal morbidity and mortality were observed in elective CS than in emergency CS.

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