Incidence And Factors Associated With Caesarean Section In Primigravida Women: A Retrospective Cohort Study

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KEYWORDS

ABSTRACT

Aim: Current study was conducted to determine the incidence and factors associated with caesarean sections in primigravida.

Methods: This retrospective study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care govt hospital from June 2021 to May 2022. A total of 2345 primigravida patients visited the hospital for delivery. Out of these, 361 underwent Caesarean Section (CS) deliveries after 28 weeks of gestation. This study focused specifically on the 361 primigravida patients who underwent either emergency or elective primary CS. Clinical data of the patients were collected from the medical records.

Results: Total number of primigravida CS were 361 (15.39%) of which emergency CS accounted for 92.0% (332 cases). Majority (79.2%) of the patients were between 21 and 30 years old. The analysis of body mass index (BMI) and period of gestation (POG) in relation to the type of CS revealed no statistically significant difference. Non-progress of labor (NPOL) was commonest indication of CS at 24.1% (87 cases) followed by Foetal distress 21,7% (78 cases), malpresentation15.8% (57 cases) and failed induction at 13.3% (48 cases). Significant obstetric risk factors in our study were GDM, hypothyroidism and obesity. GDM was more common in our population (24.3%). The analysis showed no significant association of GDM, Hypertension, Hypothyroidism , Covid 19 infection, IUGR, Thick MSL and Twin pregnancy with emergency LSCS. Anaemia, PPROM and Preeclampsia showed a high propensity for Emergency LSCS (Large OR). Breech presentation and post-IVF pregnancies were found to be significantly associated with elective LSCS, while other obstetric risk factors did not show statistically significant associations.

Conclusion: Caesarean sections are absolutely critical and can be lifesaving in certain situations where vaginal deliveries would pose hazard and reduce both maternal and neonatal mortality and morbidity, so health care infrastructure should must ensure timely access to those who need them. Contrarily, needless caesarean sections run the risk of endangering the lives and health of expectant mothers and their children. As majority of these (92% of these) were only performed as part of emergency protocol, it reflects that if strict clinical and ethical guidelines are adhered to, the rate of caesarean section could be well controlled and optimal. Improving prenatal screening programs, educating patients on healthy lifestyle as well the benefits and low risk factors for normal vaginal delivery can reduce the rising caesarean section rates and in turn enhance the maternal and neonatal outcomes as well as alleviate the financial burden on healthcare system.

INTRODUCTION

Caesarean section is the most frequently performed obstetric surgery. Globally, Caesarean section (CS) delivery rates have surged significantly over the past decade, now accounting for more than 1 in 5 (21%) of all childbirths worldwide as compared to 7% in 1990. These figures are rising steadily and estimated to be 29% by 2030 with Eastern Asian and Latin American leading the chart [1]. In India itself, CS rates increased from 17.2% in 2016 to 21.5% in 2021 [2], indicating a paradigm shift in childbirth practices. Notably, women

delivering in private healthcare facilities were four times more likely to undergo a CS compared to those in public hospitals, with rates increasing from 43.1% to 49.7% between 2016 and 2021 [2]. This means that almost one in two deliveries in the private sector in India occur via CS.
Obstetricians are becoming more permissive in their choice of delivery mode due to the increased availability of advanced diagnostic facilities. Newer investigations such as ultrasound with fetal and maternal Doppler, electronic fetal monitoring, and fetal scalp blood sampling can detect potential complications earlier, sometimes leading to pre-emptive CS [3].

But Caesarean deliveries have been linked to a fetal and maternal complications such as higher chance of children developing asthma and obesity, as well as problems in subsequent pregnancies for the mother, including intra-abdominal adhesions, uterine rupture, placenta accreta, placenta previa, ectopic pregnancy, and infertility [4]. Additionally, the cost of a Caesarean section delivery is significantly higher than that of a typical vaginal delivery imposing a heavier financial burden on both healthcare systems and families. Therefore, unnecessary Caesarean deliveries are currently a public health concern in India [5].

The indications for caesarean sections in primiparous patients are evolving. Elderly primigravida women, high-risk pregnancies, cephalopelvic disproportion, antepartum haemorrhage, and foetal distress all warrant caesarean sections [3]. The practice of Caesarean Delivery on Maternal Request (CDMR)—a primary Caesarean delivery performed at the mother's request in the absence of any maternal or fetal indication—has also led to an increase in C-section rates [4]. These factors contribute to the rising occurrence of Caesarean sections.
This paradigm shift from normal deliveries warranted a comprehensive analysis of the prevalent incidence factors determining for Caesarean sections in primigravida women in India. The aim of this study is to determine the rate, antenatal risk factors and various indications of caesarean section in primigravida women attending the institute for delivery following strict ethical guidelines & compare it to the national average

MATERIALS AND METHODS

This retrospective study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care govt hospital from June 2021 to May 2022. A total of 2345 primigravida patients visited the hospital for delivery. Out of these, 361 underwent Caesarean section deliveries after 28 weeks of gestation, while the remaining 1984 patients had normal vaginal deliveries. This study focused specifically on the 361 primigravida patients who underwent either emergency or elective primary Caesarean sections.
Detailed information was collected retrospectively from hospital records for these patients. The data included demographic details such as age, obstetric history, gestational age at the time of Caesarean section, and clinical symptoms leading to hospitalization. Antepartum and intrapartum risk factors contributing to the decision for a lower segment Caesarean section (LSCS) were documented, along with medical indications for the procedure and maternal outcomes, including postoperative recovery and any complications.

Inclusion criteria:
1. All primigravida patients with gestational period >28 weeks.
2. Emergency as well as an elective Caesarean section

Exclusion criteria:
1. Gestational period < 28 weeks
2. History of previous uterine surgery
3. Inadequate data

The collected data were systematically organized and expressed as numbers and percentages. Statistical analysis was performed using appropriate software to interpret the results. Findings were presented in tables for clarity and ease of interpretation, highlighting the prevalent indications for Caesarean sections among the study population.

Statistical analysis
Data from the 361 primiparous women who underwent Caesarean sections was analyzed using descriptive and inferential statistics. Continuous variables like age and gestational age were summarized as means with

standard deviations, while categorical variables such as type of Caesarean section, indications for surgery, obstetric risk factors, and outcomes were presented as frequencies and percentages.
Associations between some categorical variables were assessed using the Chi-square test to determine statistical significance, with a p-value of less than 0.05 considered significant.

RESULT
During the study period, the total number of primigravida caesarean deliveries was 361 (15.39%). The type of caesarean section (CS) performed was predominantly emergency, accounting for 92.0% (332 cases), while elective caesarean sections constituted 8.0% (29 cases).

Table 1: Demographic & Obstetrics Characteristics

Characteristics	Total CS	Emergency CS	Elective CS	x^2	*p -value*
Age(yrs)					
< 20	13(3.6%)	13	0		
21-30	286(79.2%)	269	17	13.58	**<0.001**
31-40	62(17.17%)	50	12		
> 40	0	0	0		
BMI (kg/m^2)					
<18.5	0	0	0		
18.5-24.9	105	98	7		
25-29.9	197	180	17	0.424	0.935
30-34.9	38	35	3		
>35	21	19	2		
Period of Gestation					
< 37wks	82 (22.7%)	79	3		
37-40 wks	270 (74.8%)	244	26	3.842	0.146
> 40 wks	9 (2.5%)	9	0		

The age distribution of the participants reveals that the majority (79.2%) were between 21 and 30 years old, with 286 individuals falling within this range.. The mean age of the participants was 26.85 years with a standard deviation of 4.02 years, indicating a relatively young cohort. The distribution of age across emergency and elective cases revealed significant differences. All participants aged ≤ 20 years underwent only emergency caesarean. In the 21-30 years group, the majority (94.1%) were emergency cases, while only 5.9% had elective procedures. For those aged 31-40 years, 80.6% were emergency cases and 19.4% were elective. No participants over the age of 40 years were recorded in either category.
The analysis of body mass index (BMI) in relation to the type of caesarean section (CS) revealed no statistically significant differences between emergency and elective procedures (chi-square = 0.424, p = 0.935). Among patients with a BMI of 18.5-24.9, 93.3% underwent emergency LSCS compared to 91.4% in BMI range of 25-29.9, 92.1% in BMI range of 30-34.9 and 90.5% in BMI of 35 or greater. There were no cases with a BMI of less than 18.5 in either group.
The type of caesarean section performed varied with the period of gestation (POG). For pregnancies less than 37 weeks, 96.3% were delivered via emergency caesarean section compared to 90.4% in 37-40 week POG. All cases with gestation exceeding 40 weeks were delivered by emergency caesarean section. The results suggest that while emergency caesarean sections are more common across all POG categories, the difference is not statistically significant for pregnancies under 37 weeks.(Table - 1)

Table – 2 Distribution of Cases according to Indication of LSCS

Indication	Total CS n(%)	Emergency CS n(%)	Elective CS n(%)
Foetal Distress	78(21.7%)	78	0
Malpresentation	57(15.8%)	37	20
Failed Induction	48(13.3%)	48	0
Abnormal Doppler	21(5.8%)	21	0
NPOL	87(24.1%)	87	0
PPROM	17(4.7%)	17	0
Preeclampsia	22(6.1%)	22	0

Oligohydramnios	9(2.5%)	9	0
Thick MSL	22 (6.1%)	22	0

The indications for caesarean section varied, with the most common being non-progress of labor (NPOL) at 24.1% . Foetal distress accounted for 21,7% , followed by malpresentation at 15.8% and failed induction at 13.3%. (Table - 2)

Table – 3 Association of Obstetric Risk Factors with CS Type

Obstetric Risk Factors	Total CS *n* (%)	Type of CS		Significance	
		Emergency	Elective		
		n (%)	n (%)	chi sq	p-value
GDM	83(24.3%)	74(22.3%)	9 (31.0%)	1.15	0.283
Hypertension	29(8%)	28(8.4%)	1 (3.4%)	0.90	0.344
Anaemia	8(2.2%)	8 (2.4%)	0 (0.0%)	0.72	0.398
Hypothyroidism	33(9.1%)	32 (9.6%)	1 (3.4%)	1.23	0.267
Preeclampsia	22(6.1%)	22 (6.6%)	0 (0.0%)	2.05	0.153
Covid positive	32(8.9%)	31 (9.3%)	1 (3.4%)	1.15	0.285
Breech	36(9.9%)	28 (8.4%)	8 (27.6%)	10.90	**0.001**
PPROM	17(4.7%)	17 (5.1%)	0 (0.0%)	1.56	0.212
IUGR	24(6.6%)	23 (6.9%)	1 (3.4%)	0.52	0.471
Post IVF	38(10.5%)	31 (9.3%)	7 (24.1%)	6.20	**0.013**
Thick MSL	22(6.1%)	22 (6.6%)	0 (0.0%)	2.05	0.153
Twins	28((7.6%)	24 (7.2%)	4 (13.8%)	1.61	0.205

The analysis of obstetric risk factors based on the type of caesarean section (CS) emergency and elective CS showed varied results (Table-3). Although no significant difference was observed for Gestational Diabetes Mellitus (GDM), Hypertension, Anaemia, Preeclampsia etc, a significant association was found with breech presentation, where 8.4% of emergency LSCS cases and 27.6% of elective cases were affected (chi-square = 10.90, p = 0.001). Post-IVF pregnancies also showed a notable significance, with 9.3% in emergency cases and 24.1% in elective cases (chi-square = 6.20, p = 0.013). Other factors like COVID positivity, thick meconium-stained liquor (MSL), twins, and intrauterine growth restriction (IUGR) did not show significant differences between the two types of LSCS. (Table- 3)

Table – 4 Logistic Regression Analysis to Estimate Risk of Obstetric Risk Factors for Emergency LSCS

Obstetric Risk Factors	B	SE	p-value	OR	95% C.I. for OR	
					Lower	Upper
GDM	-0.38	0.46	0.412	0.68	0.28	1.69
Hypertension	1.66	1.12	0.139	5.25	0.58	47.34
Anaemia	18.31	12641.36	0.999	Large	0.00	
Hypothyroidism	1.31	1.11	0.238	3.72	0.42	32.93
Preeclampsia	19.07	8314.81	0.998	Large	0.00	
Covid positive	1.25	1.06	0.240	3.49	0.43	28.01
Breech	-1.33	0.48	**0.006**	0.26	0.10	0.68
PPROM	18.89	9125.51	0.998	Large	0.00	
IUGR	0.89	1.06	0.402	2.44	0.30	19.63
Post IVF	-1.25	0.58	**0.029**	0.29	0.09	0.88
Thick MSL	18.48	8154.26	0.998	Large	0.00	
Twins	-0.37	0.71	0.607	0.69	0.17	2.79
Constant	-79.02	19460.39	0.997	0.00		

The logistic regression analysis was conducted to estimate the risk of various obstetric factors for emergency CS. The analysis showed no significant association of Gestational Diabetes Mellitus (GDM), Hypertension, Hypothyroidism, Covid 19 infection, (Intrauterine Growth Restriction) IUGR, and Twin pregnancy with emergency CS. Anaemia, Preterm Premature Rupture of Membranes (PPROM), Thick Meconium-Stained Liquor (Thick MSL): and Preeclampsia showed a high propensity for Emergency LSCS (Large OR). Breech presentation with an OR of 0.26 (95% CI: 0.10–0.68, p = 0.006) and post-IVF pregnancies with an OR of 0.29 (95% CI: 0.09–0.88, p = 0.029) reduced the likelihood of an emergency LSCS significantly. **(Table-4)**

Table 5: Association of NICU Admission with Fetal Distress

Fetal distress	NICU admission				chi sq	p-value
	No		Yes			
	No.	%	No.	%		
No	224	80.3%	55	19.7%	40.961	**<0.001**
Yes	34	43.6%	44	56.4%		

The analysis of NICU admission revealed that in babies born by LSCS with indication of foetal distress 56.4% neonates needed NICU admission as compared to only 19.7% neonates with indications other than foetal distress Chi-square value for this association was 40.961, with a p-value of less than 0.001, indicating a strong statistical significance. (Table-5)

DISCUSSION

Caesarean sections are a commonly performed obstetric procedure with its prevalence rising globally. [1,2,6] The rate of caesarean sections has risen significantly in the previous few years, making it one of the most debated topics in obstetrics. A timely CS can reduce maternal and neonatal mortality and morbidity when medically indicated. [7] The aim of study was to find the indications and risk factors for elective and emergency CS in primigravida women.

WHO expert gp recommended that the ideal CS rate should be between 10-15%. New Human Reproduction Programme (HRP) under WHO reported beneficial effect in CS rates till 10% across a population, no additional benefit in 10-30% range and inconclusive in >30% rates with respect to maternal and neonatal mortality. Our study reported of a CS rate of 15.39% similar to rates of central and south east Asia [1] and in sync with the recommendation. Although, this reference range is debatable as it was meant for populations defined by geographical boundaries and not for individual health care facilities per se.[8] Different studies have reported varying rate of CS ranging from 25.8% - 57.72%%.[4, 9-12] which is much higher than our study.

In our study, the type of caesarean section performed was predominantly emergency, accounting for 92.0% of cases, and these findings were in concordance with the studies by Bhatia N et al. where 89% were emergency CS, [13] while few studies reporting CS rate 68.6% emergency CS [4,10]. Our institute has high threshold for surgical intervention, so routine elective CS rates are very low. While leading indication was non-reassuring fetal heart rate (22%) in study by Nair e al and Kohli et al, ours leading indication was non-progression of labor (24.1%) followed by fetal distress (21.7%) a close second which was similar to study by Elrishi F et al. and Mahajan N et al which reported dystocia (26.7%) / arrest of progress (55.6%) as the primary indications for CS.[12, 14, 15,16]
Significant obstetric risk factors in our study were GDM, hypothyroidism and obesity. GDM was more common in our population (24.3%) compared to anemia (43.34%) in study conducted by Nair et al. [14] Anaemia was only present 2.2 % of cases in our study which is otherwise most prevalent obstetric risk factor with rate as high as 70% as per Indian Council of Medical Research.[17] However, the range reported varied as per geographical areas, socioeconomic status and rural / urban areas.[18,19,20] This may be because being organization based govt hospital with exclusive clientele, our patients were mostly booked and under regular follow-up. Also, socio-economic status of our patients was relatively better than national average. Hypertension was present in 8% of our population and was not a major driver of CS. On contrary, Saung Oo et al reported Hypertension along gestational age under 40 weeks, and fetal weight over 3000g were significant predictors of Caesarean delivery.[21]

Our study revealed that Anaemia, PPROM and Preeclampsia showed a high propensity for Emergency LSCS (Large OR) . Logistic regression analysis revealed Breech presentation had significantly higher elective CS

when compared to other obstetric risk factors. This was in accordance to the systemic review and meta-analysis by Wängberg et al which concluded that intended CS in term breech may reduce the risk of perinatal mortality and perinatal and to some extent maternal morbidity as compared to intended normal vaginal delivery. [22] Similarly our study found significant association of Post-IVF pregnancies with elective LSCS similar to other studies. [23]

Caesarean sections in our study were mainly performed as emergency procedure when deemed necessary so it constitutes a major chunk of our patient sample, reflecting adherence to strict clinical guidelines so as to minimize unnecessary surgical interventions. This aligns with ethical practices recommended to promote normal vaginal deliveries whenever possible, thereby reducing potential risks associated with surgery.
When comparing with national average (21% in 2021 and rising), our study shows significantly lower percentage of caesarean section performed (15.39%) required caesarean section and out of these majority were emergency procedures (92%) indicating that it was performed when deemed absolutely necessary. Due to This adherence to strict ethical guidelines regarding delivery by caesarean section and promoting vaginal deliveries when safe and feasible our study maintained a lower C-section rate, less than national average.

As the major obstetrics risk factors in our study included gestational diabetes mellitus, hypothyroidism, and obesity, early detection and management of these conditions could reduce the need for emergency caesarean sections. This highlights the importance of improved prenatal screening programs, better patient education on lifestyle practices during pregnancy like implementing nutritional counselling and promoting physical activity, and appropriate treatment of these risk factors in good time. Also important is that healthcare system should continue to support policies and practices that prioritize normal vaginal deliveries when safe, reserving Caesarean sections for cases with complications or absolutely necessary. Therefore, Obstetricians should endorse vaginal delivery as the favoured mode of delivery. This approach will not only enhance maternal and neonatal outcomes but also reduces the financial burden on healthcare system and families
Our study targeted specifically the primiparous women, providing valuable insights into the factors influencing Caesarean sections among these women. With substantial sample size for a single centre and detailed information collected on various demographic variables this dataset provides reliable inferences and allows a thorough analysis of the contributing factors.

Limitations:
Retrospective nature of the study may introduce biases related to data accuracy and completeness. And as the study was conducted in a single hospital, the findings may not be generalizable to other regions or healthcare settings with different patient populations and clinical practices. Also, the study failed to collect information on socioeconomic status of patient, education level, access to prenatal care which in turn could have affected the prevalence and it also lacked the assessment of maternal and neonatal outcomes post-delivery.

Conducting studies across other centers in different regions can increase the generalizability of the findings. Future research should also consider prospective designs to allow for real-time data collection and subsequent follow-up. Also, as we have seen in previous studies [4] also caesarean delivery was fairly common in the younger patients, developing patient education programs and counselling strategies can help address this contributing factor and can reduce the incidence of caesarean section on maternal request. Women choosing caesarean section due to fear of pain in childbirth can be educated that there is no need for unnecessary surgical procedure in the absence of any maternal and fetal indications but vaginal delivery is both safe and beneficial for not only mother but also the neonate to avoid any potential long-term complications.

CONCLUSION
Caesarean sections are absolutely critical and can be lifesaving in certain situations where vaginal deliveries would pose hazard, so health care infrastructure should must ensure timely access to those who need them. Our study demonstrated a lower rate of caesarean section performed among primiparous women with only 15.39% requiring surgical intervention. When deemed medically necessary, caesarean deliveries are absolutely critical and reduce both maternal and neonatal mortality and morbidity. Contrarily, needless caesarean sections run the risk of endangering the lives and health of expectant mothers and their children. As majority of these (92% of these) were only performed as part of emergency protocol, it reflects that if strict clinical and ethical guidelines

are adhered to, the rate of caesarean section could be well controlled and optimal. Also, it underscores the need to promote normal vaginal deliveries whenever possible through patient education as well as ethical practices, thereby reducing the potential surgical risks and associated financial burden.

Most prevalent obstetrics risk factor was gestational diabetes mellitus, hypothyroidism and obesity, so combating them requires enhanced prenatal care. Early detection and effective management of these could further reduce the rate of emergency caesarean sections. Improving prenatal screening programs, educating patients not only on healthy lifestyle as well the benefits and low risk factors for normal vaginal delivery and promoting and educating healthcare personnel also regarding safe ethical practices we can reduce the rising caesarean section rates and in turn enhance the maternal and neonatal outcomes as well as alleviate the financial burden on healthcare system and families.

ACKNOWLEDGMENTS & SOURCE OF FUNDING: NIL

CONFLICT OF INTEREST: NIL

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