Research Article

A Cross-Sectional Audit of Cesarean Deliveries Using Robson's Ten-Group Classification System at a Tertiary Care Centre

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I N F O

A B S T R A C T

Introduction: Caesarean section rates have increased globally and in India, raising concerns regarding maternal and neonatal outcomes. Auditing caesarean deliveries using a standardized classification system is essential to identify key contributing groups and develop targeted strategies. Robson's Ten-Group Classification System provides a simple, reproducible method for monitoring and comparing caesarean section rates across institutions.

Materials and Method: This cross-sectional observational study was conducted in the Department of Obstetrics and Gynecology at a tertiary care centre in Uttar Pradesh from 1st October 2023 to 31st March 2024. All women who underwent caesarean section during the study period were included. Data related to maternal demographics, obstetric characteristics, and indications for caesarean section were collected from hospital records. Caesarean deliveries were classified according to Robson's Ten-Group Classification System. Data analysis was performed using SPSS version 21, and results were expressed as frequencies, percentages, and mean deviation.

Result: A total of 352 deliveries were conducted during the study period, of which 165 were caesarean sections, yielding a caesarean section rate of 46.87%. The mean maternal age was 26.53 ± 5.1 years. Robson Group 5 was the largest contributor to caesarean sections (24.84%), followed by Group 2 (20.0%) and Group 10 (14.54%). Previous caesarean section and fetal distress were the most common indications.

Conclusion: Robson's Ten-Group Classification System effectively identified the major contributors to the high caesarean section rate. Targeted interventions focusing on reducing primary caesarean sections and promoting safe vaginal birth after caesarean may help optimize obstetric practices and improve maternal and neonatal outcomes.

Keywords: Caesarean Section, Robson Classification, Obstetric Audit, Fetal Distress, Tertiary Care Centre

Introduction

Caesarean section (CS) is one of the most commonly performed surgical procedures worldwide and has become an integral component of modern obstetric care. While caesarean delivery is a life-saving intervention when medically indicated, there has been a steady and concerning rise in caesarean section rates globally over the past few decades.[1–3] In India, data from the National Family Health Survey (NFHS) demonstrate a significant increase in caesarean deliveries, rising from 17% in NFHS-4 (2015–2016) to 21.5% in NFHS-5 (2019–2021), highlighting a growing public health concern.[1,2]

The World Health Organization (WHO) has suggested that population-level caesarean section rates above 10–15% are not associated with additional reductions in maternal or neonatal mortality.[3,4] Excessively high caesarean rates are associated with increased maternal morbidity and mortality, including postpartum hemorrhage, infections, need for blood transfusion, anesthetic complications, and injury to adjacent organs. Furthermore, caesarean delivery has long-term implications for subsequent pregnancies, such as increased risks of placenta previa, placenta accreta spectrum disorders, uterine rupture, and the need for peripartum hysterectomy.[5,6] In addition to clinical risks, caesarean section imposes a substantial economic burden on healthcare systems compared to vaginal delivery.[7,8]

Given the multifactorial nature of rising caesarean rates—driven by improved fetal surveillance, increased labor induction, changing obstetric practices, patient preference, and medicolegal concerns—there is a pressing need for systematic auditing of caesarean deliveries at institutional and regional levels.[1–3] Regular audits enable identification of specific obstetric groups contributing disproportionately to caesarean rates and help in formulating targeted, evidence-based strategies to optimize obstetric care without compromising maternal or fetal safety.

To address the lack of standardization in caesarean section audits, the Robson's Ten-Group Classification System (TGCS) was introduced and endorsed by the World Health Organization in 2015 and the International Federation of Gynecology and Obstetrics (FIGO) in 2016 as a global standard for monitoring and comparing caesarean section rates.[9] This system categorizes all women admitted for delivery into ten mutually exclusive and totally inclusive groups based on five basic obstetric characteristics: parity, previous caesarean section, gestational age, onset of labor, fetal presentation, and number of fetuses.[10,11] The simplicity, reproducibility, and clinical relevance of Robson's classification make it an effective tool for identifying target groups for intervention.

Several studies conducted across different regions have demonstrated that certain Robson groups—particularly women with previous caesarean section (Group 5), nulliparous women undergoing induction or pre-labour caesarean (Group 2), and preterm singleton cephalic pregnancies (Group 10)—contribute substantially to overall caesarean section rates, although the magnitude and order of contribution vary between institutions.[10–13] Such variations underscore the importance of conducting centre-specific audits to understand local obstetric practices and challenges.

In this context, the present study was undertaken to analyze caesarean section rates using Robson's Ten-Group Classification System at a tertiary care centre in Uttar Pradesh. The study aimed to identify the major contributors to the caesarean section rate and thereby provide evidence to guide targeted interventions for optimizing caesarean delivery practices at the institutional level.

Materials and Methods

Study Design and Setting

This cross-sectional observational study was conducted in the Department of Obstetrics and Gynecology

Study Population

The study population comprised all antenatal women who underwent caesarean section at the study centre during the specified study period. A total of 165 women who delivered by caesarean section were included in the study. During the same period, 352 total deliveries were conducted at the institution.

Inclusion Criteria

- All women who delivered by caesarean section during the study period
- Singleton and multiple pregnancies
- Term and preterm gestations
- All fetal presentations and onset of labour patterns

Exclusion Criteria

- Women who delivered vaginally
- Cases with incomplete or missing obstetric records

Data Collection

Data were collected retrospectively from labour room registers, operation theatre records, and individual patient case files using a structured data collection proforma. The following maternal and obstetric variables were recorded for each participant: maternal age, parity, history of previous caesarean section, gestational age at delivery, onset of labour, fetal presentation, number of fetuses, and indication for caesarean section.

Robson's Ten-Group Classification System

All caesarean deliveries were classified according to Robson's Ten-Group Classification System. Women were categorized into ten mutually exclusive and totally inclusive groups based on parity, history of previous caesarean section, gestational age, onset of labour, fetal presentation, and number of fetuses.

Outcome Measures

The primary outcome measure was the distribution of caesarean sections across Robson's ten groups. Secondary outcome measures included the contribution of each Robson group to the total number of caesarean sections, contribution to overall deliveries, and the spectrum of indications for caesarean section.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 21. Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized as mean ± standard deviation. The contribution of each Robson group to total caesarean sections and total deliveries was calculated. The Chi-square test was applied to assess the association between Robson groups and caesarean section rates, and a p-value of less than 0.05 was considered statistically significant.

Results

Overall Caesarean Section Rate

During the six-month study period, a total of 352 deliveries were conducted at the study centre. Out of these, 165 women underwent caesarean section, resulting in an overall caesarean section rate of 46.87%.

Sociodemographic Characteristics of the Study Participants

The sociodemographic profile of the study participants is summarized in Table 1. The mean age of women who underwent caesarean section was 26.53 ± 5.1 years. The majority of participants, 125 women (78.12%), belonged to the 20–35 years age group, followed by 22 women (13.33%) aged more than 35 years. Eighteen women (10.90%) were below 20 years of age. With respect to area of residence, most women were from rural areas, accounting for 138 cases (83.63%), while 27 women (16.36%) belonged to urban areas.

Regarding parity, multiparous women formed the majority of the study population, with 123 women (74.54%), whereas nulliparous women constituted 42 cases (25.45%), as detailed in Table 1.

Obstetric Characteristics

The obstetric characteristics of the study participants are presented in Table 2. A history of previous caesarean section was absent in 107 women (64.84%). One previous caesarean section was noted in 34 women (20.0%), while 24 women (14.54%) had a history of more than one caesarean section.

In terms of gestational age at delivery, most caesarean sections were performed at term (≥37 weeks), accounting for 108 cases (65.45%), whereas preterm caesarean sections (<37 weeks) were observed in 57 women (34.54%). Analysis of onset of labour revealed that 34 women (20.60%) presented with spontaneous labour, induction of labour was carried out in 40 women (24.24%), and a substantial proportion of caesarean sections, 91 cases (51.15%), were performed before the onset of labour.

Cephalic presentation was the most common fetal presentation, observed in 131 cases (79.39%). Breech presentation was seen in 30 women (18.18%), while transverse lie was noted in 4 cases (3.22%). Singleton pregnancies constituted the majority, with 154 women (93.33%), whereas twin pregnancies were present in 11 cases (6.66%), as shown in Table 2.

Distribution of Caesarean Sections According to Robson's Ten-Group Classification System

The distribution of caesarean sections according to Robson's Ten-Group Classification System is depicted in Table 3. Group 5 (previous caesarean section, singleton, cephalic, ≥37 weeks) emerged as the largest contributor to the overall caesarean section rate, accounting for 41 cases (24.84% of all caesarean sections) and contributing 11.64% to the total number of deliveries.

Group 2 (nulliparous women with singleton, cephalic pregnancy at ≥37 weeks who underwent induction of labour or pre-labour caesarean section) was the second highest contributor, with 33 cases (20.0% of all caesarean sections) and contributing 9.37% to total deliveries.

The third major contributor was Group 10 (singleton, cephalic, preterm pregnancies including previous caesarean section), which accounted for 24 cases (14.54% of caesarean sections) and contributed 6.81% to overall deliveries. Group 4 (multiparous women without previous caesarean section, singleton, cephalic, ≥37 weeks, induced labour or pre-labour caesarean) contributed 16 cases (9.69%) to the overall caesarean section rate.

The remaining Robson groups, namely Groups 1, 3, 6, 7, 8, and 9, together accounted for 51 caesarean sections, contributing 30.90% of all caesarean sections and 14.4% of

total deliveries, as detailed in Table 3. Statistical analysis using the Chi-square test showed that caesarean section rates were significantly higher in Groups 5, 2, and 10 when compared with the other Robson groups (p < 0.001).

Indications for Caesarean Section

The indications for caesarean section were also analyzed. The most common indication was previous caesarean section, accounting for 38 cases (23.0%). This was followed by fetal distress, which was the indication in 34 women (20.6%). Other indications included cephalopelvic disproportion in 11 cases (8.87%), maternal request in 9 cases (7.25%), placenta previa in 8 cases (6.45%), contracted pelvis and breech presentation in 7 cases each (5.64%), failed induction of labour in 6 cases (4.8%), hypertensive disorders of pregnancy in 5 cases (4.03%), placental abruption in 4 cases (3.22%), and transverse lie in 4 cases (3.22%).

Table 1.Sociodemographic characteristics of study participants

n = 165

Variable	Category	Number	Percentage (%)
Age (years)	< 20	18	10.90
	20–35	125	78.12
	> 35	22	13.33
Area of residence	Urban	27	16.36
	Rural	138	83.63
Parity	Nulliparous	42	25.45
	Multiparous	123	74.54
Mean age (years)	—	26.53 ± 5.1	—

Table 2. Obstetric characteristics of study participants

n = 165

Variable	Category	Number	Percentage (%)
Previous caesarean section	None	107	64.84
	One	34	20.00
	More than one	24	14.54
Gestational age	< 37 weeks	57	34.54
	≥ 37 weeks	108	65.45
Onset of labour	Spontaneous	34	20.60
	Induced	40	24.24
	Pre-labour caesarean	91	51.15
Fetal presentation	Cephalic	131	79.39
	Breech	30	18.18
	Transverse lie	4	3.22
Number of fetuses	Singleton	154	93.33
	Twin	11	6.66

Table 3.Distribution of caesarean sections according to Robson's Ten-Group Classification System

Robson group	Description	Number of CS	Contribution to total CS (%)	Contribution to total deliveries (%)
Group 1	Nulliparous, singleton, cephalic, ≥37 weeks, spontaneous labour	10	6.06	2.84
Group 2	Nulliparous, singleton, cephalic, ≥37 weeks, induced or pre-labour CS	33	20.00	9.37

Group 3	Multiparous (no previous CS), singleton, cephalic, ≥37 weeks, spontaneous labour	7	4.24	1.98
Group 4	Multiparous (no previous CS), singleton, cephalic, ≥37 weeks, induced or pre-labour CS	16	9.69	4.54
Group 5	Previous CS, singleton, cephalic, ≥37 weeks	41	24.84	11.64
Group 6	All nulliparous breech	8	4.84	2.27
Group 7	All multiparous breech (including previous CS)	7	4.24	1.98
Group 8	All multiple pregnancies (including previous CS)	10	6.06	2.84
Group 9	All abnormal lies (including previous CS)	9	5.45	2.55
Group 10	Singleton, cephalic, <37 weeks (including previous CS)	24	14.54	6.81

Discussion

In the present study, the mean age of women undergoing caesarean section was 26.53 ± 5.1 years, with the majority of participants belonging to the 20–35 years age group. Similar age distributions have been reported in other Indian studies. Mittal et al. (2020).[10] observed a mean maternal age of 25.8 ± 4.9 years, with nearly three-fourths of women undergoing caesarean delivery falling within the 20–35 years age bracket. Pravina et al. (2022).[14] also reported that approximately 75–80% of women who underwent caesarean section were within this reproductive age group. This reflects the peak childbearing age and increased obstetric interventions during this period.

A predominance of rural residence (83.63%) was noted in the present study, indicating that the tertiary care centre catered mainly to a rural referral population. Pati et al. (2018)[12] similarly reported that 78% of their caesarean section patients were from rural areas, attributing higher operative delivery rates to delayed referrals and increased obstetric complications. Pravina et al. (2022)[14] also documented a rural predominance of more than 80%, reinforcing the role of tertiary centres as referral hubs for high-risk pregnancies.

Multiparous women constituted 74.54% of the study population. Tanaka and Mahomed (2017)[6] reported a comparable multiparity rate of approximately 70% among women undergoing caesarean section, suggesting that increasing parity and previous obstetric history significantly influence the mode of delivery.

As shown in Table 2, more than one-third of women had a history of previous caesarean section. Similar findings have been reported by Mittal et al. (2020),[10] who observed previous caesarean section in 32.1% of their study population, and by Shenoy et al. (2019),[15] who reported a prevalence of 35.4%. These findings confirm that a previous caesarean section remains one of the strongest predictors of repeat operative delivery.

In the present study, 65.45% of caesarean sections were performed at term, while 34.54% were preterm. Sungkar et al. (2019)[13] reported comparable preterm caesarean rates ranging from 28% to 35% in tertiary care hospitals. Abubeker et al. (2020)[4] similarly documented a high proportion of preterm caesarean deliveries, particularly in centres managing complicated pregnancies.

More than half of the caesarean sections in the present study were performed before the onset of labour. Tanaka and Mahomed (2017)[6] reported a pre-labour caesarean rate of approximately 50%, attributing this trend to planned repeat caesarean sections, antenatal detection of high-risk conditions, and maternal preference. Despite the predominance of singleton cephalic presentations, a substantial number of caesarean sections were performed in these potentially low-risk scenarios, echoing findings by Abubeker et al. (2020).[4]

Robson Group 5 was the largest contributor to the overall caesarean section rate in the present study, accounting for 24.84% of all caesarean sections. Similar contributions of Group 5 have been reported by Pravina et al. (2022).[14] who observed a contribution of 26.1%, and by Mittal et al. (2020),[10] who reported a contribution of 23.8%. Jawa et al. (2017)[16] also documented that Group 5 alone contributed nearly one-fourth of caesarean deliveries. These findings

highlight the cumulative effect of primary caesarean sections and the low uptake of vaginal birth after caesarean.

Robson Group 2 was the second highest contributor in the present study, accounting for 20.0% of caesarean sections. Pati et al. (2018)[12] reported a similar contribution of 21.3%, while Shenoy et al. (2019)[15] documented a contribution of 18.7%. As this group comprises nulliparous women undergoing induction of labour or pre-labour caesarean section, the high contribution indicates significant scope for reducing primary caesarean deliveries through optimized labour induction protocols and improved intrapartum monitoring.

Robson Group 10 contributed 14.54% of caesarean sections in the present study. Sungkar et al. (2019)[13] reported Group 10 contributions ranging between 13% and 17%, particularly in tertiary centres managing preterm and high-risk pregnancies. Abubeker et al. (2020)[4] similarly observed that Group 10 accounted for approximately 15% of caesarean sections. The high contribution of this group reflects the increased use of operative delivery to improve perinatal outcomes in preterm births.

Groups 1 and 3 contributed relatively less to the overall caesarean section rate, consistent with findings by Jardine et al. (2020),[17] who demonstrated lower operative delivery rates among women in spontaneous labour, particularly multiparous women. Groups 6 and 9 showed near-universal caesarean delivery, which is in line with standard obstetric practice due to the risks associated with vaginal delivery in breech presentations and abnormal lies.

Overall Interpretation

The present study demonstrates that Robson Groups 5, 2, and 10 collectively accounted for more than half of all caesarean sections, a pattern consistently reported across national and international studies including those by Mittal et al. (2020),[10] Pati et al. (2018),[12] Shenoy et al. (2019),[15] Pravina et al. (2022),[14] and Abubeker et al. (2020).[4] These findings reinforce the importance of reducing primary caesarean sections, promoting safe vaginal birth after caesarean, and optimizing management of induced and preterm labours through evidence-based strategies.

Conclusion

The present study demonstrated a high caesarean section rate, with Robson Groups 5, 2, and 10 being the major contributors. Use of Robson's Ten-Group Classification System effectively identified target groups for intervention. Focused strategies to reduce primary caesarean sections and promote safe vaginal birth after caesarean may help optimize caesarean delivery practices without compromising maternal or neonatal outcomes.

Limitations of the Study

This study was conducted at a single tertiary care centre, which may limit the generalizability of the findings. The retrospective design relied on available records, and detailed information on labour management and neonatal outcomes could not be assessed. Additionally, factors influencing clinical decision-making for caesarean section were not explored.

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