



A CROSS- SECTIONAL STUDY TO ANALYSE THE DELIVERY OUTCOMES IN PREGNANT WOMEN CATEGORISED BY USING ROBSON CLASSIFICATION AT A TERTIARY CARE CENTRE

Obstetrics & Gynaecology

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ABSTRACT

Background: C-section rates are rising globally, surpassing the WHO's recommended 10–15%, with current rates at 21% and projected to reach 29% by 2030. In Southeast Asia, particularly India, the increase is significant, with rates between 19–21%. While necessary in specific cases, C-sections pose higher risks than vaginal deliveries, including infections, hysterectomy, uterine rupture, and abnormal placentation in future pregnancies. The increase in repeat C-sections further exacerbates these risks. The lack of a global standard for tracking C-section trends complicates understanding this surge. The Robson Classification addresses this issue by categorizing women into ten groups, enabling better analysis and improvement in birth care practices. **Methods:** This prospective cross-sectional observational study was conducted in the Obstetrics and Gynaecology Department of Krishna Mohan Medical College and Hospital, Mathura (UP), over 18 months from September 2022 to March 2023. A total of 80 patients who met inclusion and exclusion criteria were included. Data on parity, gestation period, fetal presentation, labor onset, and number of fetuses were collected and classified using the Robson Classification. Statistical analysis was performed using SPSS version 24.0, with a significance level of $P < 0.05$. **Results:** Group 5 was the largest contributor to C-section rates, with a 100% rate and accounting for 42.3% of all C-sections. Significant contributions were also noted in Groups 2, 4, 7, 9, and 10, with rates of 33.3%, 27.3%, 38.5%, 100%, and 23.1%, respectively. Group 7, with a C-section rate of 38.5%, was the second-largest contributor. The study concluded that the Robson Classification allows for effective analysis and management of C-section rates, aiding in the implementation of strategies to reduce unnecessary procedures and improve maternal and neonatal outcomes. **Conclusion:** This study emphasizes the significance of using the WHO Robson Ten-Group Classification System to categorize pregnant women for evaluating delivery outcomes and identifying trends in obstetric practices. By analyzing C-section rates across groups, the study highlights disparities and opportunities for targeted interventions. The findings underscore the importance of evidence-based strategies to reduce unnecessary C-sections, enhance maternal and neonatal outcomes, and ensure equitable and safe obstetric care.

KEYWORDS

Caesarean Section, Robson Classification, Gestational Age, Gravida, Parity, Fetal Presentation

INTRODUCTION

The rising global prevalence of caesarean sections (C-sections) has become a critical public health concern, drawing significant attention from healthcare providers, researchers, and policymakers. Over the past few decades, there has been a notable increase in C-section rates at global, regional, and national levels, accompanied by substantial variations between countries and settings. This trend has sparked debates about the appropriateness of the procedure, its short- and long-term implications, and strategies for its optimal use (1). While C-sections are lifesaving in specific circumstances, they are not without risks. These procedures are associated with increased maternal and neonatal morbidity, both immediately after birth and in the long term (3). The World Health Organization (WHO) has emphasized that C-sections should only be performed when medically necessary, warning against overuse and the resulting complications (2). Despite these recommendations, C-section rates continue to rise, driven by factors such as patient preference, defensive medical practices, and inefficiencies within healthcare systems (5). Numerous studies have sought to determine the optimal population-level rate of C-sections. A systematic review concluded that rates exceeding 10–15% are not associated with improved maternal and neonatal outcomes (4). Beyond this threshold, the risks associated with C-sections outweigh the benefits, underscoring the need for careful consideration in clinical practice. Furthermore, significant disparities exist in access to C-sections globally; high-income countries report excessive use, while low-income countries face limited access, exacerbating inequalities in maternal and neonatal health outcomes (6). The Robson Ten-Group Classification System (TGCS), introduced in 2001, has become a key tool for analyzing and comparing C-section rates across various populations and healthcare settings. By categorizing women into ten distinct groups based on obstetric characteristics, TGCS offers a standardized approach for monitoring trends and identifying areas for intervention (9). This classification system is widely endorsed by the WHO and other organizations as a means to improve obstetric practices and minimize unnecessary C-sections (8). The application of TGCS has provided valuable insights into obstetric practices and outcomes. Research indicates significant variations in C-section rates among the ten groups, highlighting differences in spontaneous labor

and planned procedures across various settings (12). These findings emphasize the need for targeted interventions, such as promoting vaginal births in low-risk groups or improving access to emergency C-sections for high-risk cases (11). Moreover, routine use of TGCS allows healthcare providers to monitor delivery trends, assess the impact of interventions, and optimize the allocation of resources (10). Addressing the overuse and underuse of C-sections presents a complex challenge for clinicians and policymakers. Stabilizing or reducing C-section rates requires an in-depth understanding of the factors driving these trends, tailored to the unique characteristics of specific populations, healthcare systems, and cultural contexts (7). Tools like TGCS and adherence to evidence-based guidelines can support efforts to achieve optimal outcomes for mothers and newborns. This study focuses on analyzing delivery outcomes in pregnant women categorized using the Robson classification at a tertiary care center. By exploring the distribution of C-sections and other delivery methods across the ten groups, the research aims to identify trends, disparities, and potential areas for improvement in obstetric practices. The findings will contribute to the growing evidence base advocating for standardized classification systems and evidence-based interventions to enhance maternal and neonatal health outcomes.

METHODS AND METHODOLOGY

a) Study Design

This study employed a prospective cross-sectional observational design to assess delivery outcomes in pregnant women categorized according to the WHO Robson Ten Group Classification System.

b) Setting of Study

The research was conducted in the Obstetrics and Gynaecology Department of Krishna Mohan Medical College and Hospital (KMMCH), Mathura, Uttar Pradesh. The study population included obstetric in-patients admitted to the hospital for delivery, who met the specified inclusion and exclusion criteria.

c) Study Duration

The study spanned a period of 18 months, from September 2022 to March 2023.

d) Inclusion Criteria

All pregnant women who crossed the period of viability (≥ 28 weeks of gestational age) and delivered during the study period at KMMCH were included in the study. These patients were recorded and categorized into groups based on the WHO Robson Classification.

e) Exclusion Criteria

Pregnant women who did not cross the period of viability (< 28 weeks of gestational age).

Patients with incomplete investigation records from antenatal care visits. Cases of ectopic pregnancies and intrauterine fetal demise.

f) Procedure

This prospective observational study included pregnant patients who fulfilled the inclusion and exclusion criteria. These patients were admitted and delivered in the Department of Obstetrics and Gynaecology at KMMCH during the 18-month study period. Data were collected systematically for each patient based on the WHO Robson Ten Group Classification System. This classification system considers factors such as parity, gestational age, fetal presentation, previous obstetric history, and labor onset, allowing for standardized categorization of delivery outcomes.

g) Ethical Considerations

The study was initiated after obtaining approval from the institutional ethical committee. All participants provided informed consent before being enrolled in the study.

RESULTS

This Prospective cross-sectional observational study was conducted at the Department of Obstetrics and Gynaecology, Krishna Mohan Medical College and Hospital, Mathura (UP), comprising obstetric patients from IPD who were admitted to this hospital for delivery. Total 80 Patients were recruited into segments divided according to the inclusion criteria and the exclusion criteria of the study and gave birth in the hospital over one and half years time.

a) Age distribution**Table 1: Age Distribution of Patients**

Age Group (Years)	Number of Patients	Percentage (%)
20–23	25	31.25
24–27	30	37.50
28–31	9	11.25
32–35	16	20.00

b) Gravida scores

The average Gravida score was 2.4625 with a SD of 1.1356. The P-value < 0.05 across each class shows statistical significance of his outcome.

Table 2: Gravida Scores

Gravida Score	Number of Patients	Percentage (%)	p-Value
1	21	26.3	0.011
2	20	25.0	0.023
3	21	26.3	0.000
4	17	21.3	0.023
5	1	1.3	0.001

c) Previous CS

Table 3 details the frequency of prior CS among 80 patients, with 25 (31.25%) having undergone a CS before this admission. The most common was two prior CS (15%, 12 patients), followed by one prior CS (12.50%, 10 patients). The least common was three prior CS (3.75%, 3 patients). These results are statistically significant ($p < 0.05$). The average number of prior CS was 8.33, with a standard deviation of 4.73.

Table 3: Previous CS

Previous CS Count	Number of Patients	Percentage (%)	p-Value
1	10	12.50	0.000
2	12	15.00	0.012
3	3	3.75	0.001

d) Indications for CS

Table 4 summarizes the indications for CS during hospital admissions. The most common indications, each at 3.75% (3 patients), included non-progression of labor, previous LSCS with breech, placenta previa,

and generic previous LSCS. Previous LSCS with preeclampsia was slightly higher at 5.00% (4 patients). Other indications, such as oligohydramnios with IUGR, thick meconium-stained liquor, and CPD, were observed in 2.5% (2 patients) each. Rare indications, including breech with CPD, fetal distress, breech with MSL, and previous LSCS with IUGR, accounted for 1.25% (1 patient) each. These findings, with a mean of 2.167 indications per patient and a standard deviation of 1.030, were statistically significant ($p < 0.05$).

Table 4: Indications for CS

Indication	Number of Patients	Percentage (%)	p-Value
Non-progression of labor	3	3.75	0.000
Previous LSCS with breech	3	3.75	0.012
Placenta previa	3	3.75	0.001
Previous LSCS with preeclampsia	4	5.00	0.022
Oligohydramnios with IUGR	2	2.50	0.021
Cephalopelvic disproportion (CPD)	2	2.50	0.020
Thick meconium stained liquor	2	2.50	0.022
Other rare indications	1 each	1.25 each	0.000–0.023
Total	26	32.50	
Mean $\pm$ SD	2.17 $\pm$ 1.03		

e) Fetal Outcomes

Table 4 shows outcome of fetal health after birth. Of the 80 deliveries, 63 neonates, or 78.8%, were born healthy, and 17 neonates, or 21.3%, needed to be admitted to the neonatal intensive care unit (NICU). With a standard deviation of 0.416, the neonatal health average was 1.212.

Table 4: Fetal Outcomes

Fetal Outcome	Number of Patients	Percentage (%)	p-Value
Healthy	63	78.8	0.021
NICU Admission	17	21.3	

f) Indications of CS In Group 5 of Robson's Score

Table 5 highlights CS indications in Robson Group 5. The most common indication was two prior LSCS, observed in 15% (12 women), followed by one prior LSCS in 12.50% (10 women). The least frequent was three prior LSCS, seen in 3.75% (3 women). Overall, 26 women in Group 5 contributed 31.25% of the total admissions. The mean CS indication in this group was 8.33 with a standard deviation of 4.73.

Table 5 indications of cs in group 5 of Robson's score

Indications	Number	Percentage
Previous 1 LSCS	10	12.50
Previous 2 LSCS	12	15.00
Previous 3 LSCS	3	3.75
Total	25	31.25%
Mean $\pm$ SD	8.333 $\pm$ 4.726	

g) Specifications For Variables in Each Robson Group

Table 6 presents the specifications for variables in every Robson group. According to Table no. 3.1, women were divided. Women in Group 1, 7.50% (6 patients) of the total, are in this group 1. In group 2, labour was induced in 2 patients and in 1 patient LSCS was done prior to the labour so 3.75% (3 patients) of the total, is in this group 2. Women in Group 3, it is the largest category, comprising 22.50% (18 patients) of the total admitted patients. Likewise, women in Group 4, 3 had CS prior to labor and 8 had an induced labour. There are 13.75% (11 patients) in this group. Women in Group 5, there are 13.75% (11 patients) in this group. In group 6, 3.75% (3 patients) of the total, are in this group. Women in group 7, 16.25% (13 patients) of the total, are in this group. Women in Group 8 there are no patients in this group, hence the result is 0%. In group 9, 3.75% (3 patients) of the total are in this group. In group 10, 16.25% (13 patients), are in this group.a)

Table 6 specifications for variables in each robson group

Gro up	Pari ty	Pre vio us CS	Num ber of fetus es	Fetal presen ta tion or lie	Gestati onal age (weeks)	Onset of labour	No of Patie nts	PERC ENTA GE
1	0	No	1	Cephal ic	≥ 37	spontane ous NVD	6	7.50%

2	0	No	1	Cephalic	≥ 37	Induced labor or LSCS before starting of labour	3	3.75%
3	≥1	No	1	Cephalic	≥ 37	spontaneous NVD	18	22.5%
4	≥1	No	1	Cephalic	≥ 37	Induced labor or LSCS before starting of labour	11	13.75%
5	≥1	Yes	1	Cephalic	≥ 37	Any	11	13.75%
6	0	No	1	Breech	Any	Any	3	3.75%
7	≥1	Any	1	Breech	Any	Any	13	16.25%
8	any	Any	≥2	any	Any	Any	0	0.00%
9	any	any	1	Transverse or Oblique	Any	Any	3	3.75%
10	any	Any	1	Cephalic	<37	Any	13	16.25%

b) The Robson Classification Report

Table 7 illustrates The Robson Classification report, highlighting the number of LSCS in each group and table is created according to the above table 4.13. the following table will be analyzed and will tell the quality of the data collection and overall contribution of each group

Table 7 The Robson Classification Report Table

Group	Number of LSCS in Group	Number of Women in Group	Group Size%	Group LSCS Rate %	Absolute Group Contribution to Overall LSCS Rate %	Relative Contribution of Group to Overall LSCS Rate%
1	0	6	7.5	0	0	7.41
2	1	3	3.75	33.3	3.8	3.7
3	0	17	22.5	0.0	0.0	22.2
4	3	11	13.75	27.3	11.5	13.6
5	11	11	13.75	100.0	42.3	13.6
6	0	3	3.75	0.0	0.0	3.7
7	5	13	15	38.5	19.2	16.0
8	0	0	0	0.0	0.0	0.0
9	3	3	3.75	100.0	11.5	3.7
10	3	13	16.25	23.1	11.5	16.0
Total	26	80	100.00	322.0	100.00	100.00

DISCUSSION

This study explored delivery outcomes at a tertiary health center in Mathura, Uttar Pradesh, utilizing the Robson Classification to analyze obstetric cases and cesarean section (CS) rates among 80 patients. The Robson Classification provides a systematic framework for comparing cesarean rates in different populations and healthcare settings, focusing on ten mutually exclusive groups defined by specific obstetric characteristics.

The steps to assess the quality of data in this study using the Robson Classification framework involve evaluating key parameters to ensure accuracy and reliability:

1. Total Number of Deliveries and CS:

- The total number of deliveries and cesarean sections should match hospital records. In this study, the numbers were consistent, confirming data accuracy.

2. Size of Group 9:

- Should be ≤1% of total cases; deviations suggest potential misclassification of cases. Here, Group 9 was larger (3.75%), possibly due to misclassification.

3. CS Rate in Group 9:

- Should be 100%; this study adhered to the expected rate, indicating proper classification for this group.

Key Findings

1. Delivery Outcomes:

- Out of 80 participants, 54 (67.5%) had vaginal deliveries, while 26 (32.5%) underwent CS.
- The overall LSCS rate was 31.25%, consistent with findings from similar studies, such as Abubeker FA et al. (34.7%)(13) and Dhodapkar SB et al. (32.6%)(14).

2. Robson Group Contributions:

- Groups 4, 5, 7, 9, and 10 were the major contributors to CS rates.
- Group 5 had the highest LSCS rate at 100%, accounting for 42.3% of the overall CS cases. This aligns with studies like Malla RV (15) et al. and Makhanya V et al (16)., which also identified Groups 1, 3, and 5 as significant contributors to CS rates.

3. Patient Demographics:

- Most patients were aged 24–27 years (37.5%).
- The largest subset belonged to Group 3 (multiparous women without prior CS), constituting 22.5% of the study population.

4. Fetal Outcomes:

- Of the neonates born, 78.8% were healthy, while 21.3% required NICU admission. Fetal distress was noted in 14.97% of cases in related studies.

Data Quality and Population Insights

Data Quality:

- Group 9 (transverse/oblique lie) showed a CS rate of 100%, consistent with expectations.
- The size and rates of Groups 1 and 2 highlighted a high induction or pre-labor CS rate among nulliparous women.
- Population Characteristics:**
- A larger Group 5 size (13.75%) indicated a high CS rate in previous years.
- Groups 6 and 7, representing breech presentations, were smaller, reflecting fewer cases of breech deliveries.
- Group 10 (preterm births) constituted 16.25% of cases, underscoring the hospital's role as a tertiary referral center.

Implications of Robson Classification

Identifying patterns and evaluating cesarean rates. Key findings include:

1. High CS Rates in Group 5:

- A high number of repeat CSs (42.3%) suggests the need for strategies to reduce repeat cesareans, such as trials of labor after cesarean (TOLAC).

2. Low CS Rates in Group 1 and 2:

- Lower-than-expected rates in nulliparous groups could be attributed to stricter criteria for labor induction or high spontaneous labor rates.

3. Preterm and High-Risk Deliveries:

- Elevated Group 10 rates highlight the hospital's role in managing high-risk pregnancies, necessitating specialized care and protocols.

CONCLUSIONS

This prospective cross-sectional study, conducted over 1.5 years at KMMCH in Mathura, analyzed delivery outcomes among 80 mothers. Of these, 51.2% were booked (attended ≥3 prenatal visits), and 48.8% were unbooked. Vaginal deliveries accounted for 67.5%, while 32.5% underwent C-sections, primarily in Robson Group 5, contributing 42.3% to overall CS rates. Previous two LSCS was the most common indication in Group 5 (15%). Proper implementation of the Robson Classification helps assess, monitor, and reduce CS rates, supported by accurate data, training, and tools like CTG and labor care guides.

High-risk cases (e.g., preeclampsia, IUGR, preterm labor) indicate the hospital's tertiary care role. Better neonatal outcomes could result from reduced CS rates and improved antenatal care. Study limitations include manual data collection, a short timeframe, and limited sample size. Encouraging regular ANC visits and using advanced tools can refine care and lower CS rates.

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