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Original Research Article

Analysis of Caesarean Section Rate Using Robson Ten Group Classification System in a Tertiary Teaching Hospital, Visakhapatnam, Andhra Pradesh

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Abstract:

Background: Caesarean section is a key indicator of maternal healthcare quality and accessibility. Globally rising CS (Caesarean Section) rates have raised concerns, necessitating standardized evaluation methods. The Robson Ten Group Classification System, recommended by the WHO, provides a structured and evidence-based approach to assess, monitor, and compare CS rates across institutions. This study aims to analyze CS trends using this system and identify major contributing groups to improve maternal and neonatal outcomes.

Methods: A retrospective observational study was conducted at Government Victoria Hospital, Visakhapatnam, from March 1, 2024, to May 25, 2024. All deliveries during this period were categorized into Robson's ten groups based on obstetric characteristics. Data on total deliveries, number of CS, group size, and indications were analyzed to determine CS rates, relative contributions, and areas needing intervention.

Results: Out of 1014 total deliveries, 471 were caesarean sections, resulting in an overall CS rate of 45.8%. The highest contribution to the overall CS rate was from Group 5 (18.62%), followed by Group 2 (12.52%), Group 1 (3.94%), Group 4 (3.84%), and Group 10 (3.84%). Group 2 showed a high CS rate (63.5%), particularly among induced labour cases. Group 5 exhibited an exceptionally high CS rate (98.95%), reflecting repeat caesarean practices.

Conclusion: The Robson classification system is an effective tool for auditing CS rates and identifying high-risk groups. The study highlights an elevated CS rate compared to WHO recommendations, primarily driven by repeat CS and induced labour cases. Strategies such as reducing primary CS, promoting VBAC (Vaginal Birth after Caesarean), standardizing induction protocols, and regular clinical audits can help optimize CS rates and improve maternal healthcare outcomes.

Keywords: Caesarean Section, Robson Classification, Maternal Health, VBAC, Labour Induction, Obstetric Audit.

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Introduction

Caesarean section is one of the most commonly performed surgical procedures in obstetrics and serves as an important indicator of maternal healthcare quality and accessibility worldwide [1]. Initially intended as a life-saving intervention for situations where vaginal delivery poses risks to the mother or fetus, CS has significantly contributed to reductions in maternal and neonatal morbidity and mortality when appropriately indicated [2]. However, there has been a substantial global rise in CS rates over recent decades, raising concerns about its overuse and associated complications [3].

The WHO (World Health Organization) states that population-level CS rates above 10–15% are not associated with additional reductions in maternal and neonatal mortality [1]. Despite these findings,

many countries have reported rates well above this threshold. This increase is attributed to multiple factors, including advanced maternal age, increased labour inductions, improved fetal monitoring, medico-legal concerns, and a decline in instrumental vaginal deliveries [4].

Unnecessary caesarean sections are associated with increased risks such as postpartum hemorrhage, infection, thromboembolic events, and complications in subsequent pregnancies, including placenta previa and uterine rupture [5]. Therefore, monitoring and optimizing CS rates is essential to ensure safe and effective obstetric care.

To standardize the assessment of CS rates, Michael Robson introduced the TGCS (Ten Group Classification System), which categorizes women into ten groups based on obstetric characteristics such as parity, gestational age, onset of labour, fetal presentation, and previous CS [6]. This system is simple, reproducible, and allows meaningful comparison across institutions. Recognizing its effectiveness, WHO has recommended the Robson classification as a global standard for monitoring CS rates [7].

Studies using the Robson classification have consistently identified Group 5 (previous CS) and Group 2 (induced or pre-labour CS in nulliparous women) as major contributors to rising CS rates [8]. Identifying such high-contributing groups enables targeted interventions such as promoting VBAC (Vaginal Birth after Caesarean), optimizing induction practices, and improving labour management.

Aims and Objectives: The study aims to analyze caesarean section rates using the Robson Ten Group Classification System in order to identify the major contributing groups. Additionally, the study seeks to evaluate institutional practices in relation to established obstetric guidelines, with the objective of optimizing delivery methods and improving both maternal and neonatal health outcomes.

Materials and Methods

Study Design: This study was designed as a retrospective observational study conducted at Government Victoria Hospital, Visakhapatnam, a tertiary teaching hospital. The study involved reviewing and analyzing data of all deliveries that occurred over a defined period, from March 1, 2024, to May 25, 2024.

Inclusion and Exclusion Criteria: All women who delivered at Government Victoria Hospital during the study period were included in the study irrespective of age, parity, gestational age, or obstetric risk factors. Both vaginal and caesarean deliveries were considered for classification under the Robson Ten Group system. Cases with incomplete or missing essential obstetric data required for classification, such as parity, gestational age, fetal presentation, or previous caesarean history, were excluded from the study to ensure accuracy in group allocation and analysis.

Data Collection Procedure: Data were collected retrospectively from hospital medical records, delivery registers, and case sheets of all women who delivered during the study period. Relevant obstetric details, including maternal age, parity, previous caesarean section history, gestational age, onset of labour (spontaneous, induced, or pre-labour caesarean section), fetal presentation, and number of fetuses were recorded. Based on these parameters, each case was categorized into one of the ten Robson groups. Additional data regarding indications for caesarean section and delivery outcomes were also extracted for further analysis.

Statistical Analysis: The collected data were compiled and analyzed using descriptive statistical methods. Caesarean section rates were calculated for each Robson group as the proportion of caesarean deliveries to total deliveries within that group. The relative size of each group and its contribution to the overall caesarean section rate were also determined using percentage calculations. The results were presented in tabular form to facilitate comparison between groups and to identify major contributors to the overall caesarean section rate, along with trends and areas requiring intervention.

Results

Table 1: Rate of Normal Delivery and Caesarean Section

Parameter	Number	Percentage
Total Deliveries	1014	100%
Total Caesarean Sections	471	45.8%
Vaginal Deliveries	543	54.2%

Table 1 illustrates the overall delivery statistics during the study period. The caesarean section rate was 45.8%, which is considerably higher than WHO recommendations, indicating the need for detailed group-wise analysis.

Table 2: Caesarean Section Rate by Robson Groups

Group	CS (A)	Total (B)	CS Rate (%)
1	40	187	21.39
2	127	200	63.5
3	8	229	3.49
4	39	95	41.05
5	189	191	98.95
6	9	10	90.0
7	7	8	87.5
8	9	10	90.0
9	4	4	100
10	39	76	51.32

Table 2 shows the caesarean section rates across all Robson groups. Group 5 had the highest CS rate among major groups, while Group 9 showed a 100% CS rate due to abnormal presentations.

Table 3: Relative Size of Each Robson Group

Group	Total Deliveries	Relative Size (%)
1	187	18.4
2	200	19.72
3	229	22.56
4	95	9.36
5	191	18.82
6	10	0.99
7	8	0.79
8	10	0.99
9	4	0.39
10	76	7.49

Table 3 represents the distribution of women across Robson groups. Group 3 constituted the largest proportion, followed by Groups 2 and 5, indicating a high burden of low-risk multiparous and nulliparous women.

Table 4: Contribution of Each Group to Overall CS Rate

Group	Contribution (%)
1	3.94
2	12.52
3	0.79
4	3.84
5	18.62
6	0.89
7	0.69
8	0.89
9	0.39
10	3.84

Table 4 highlights the contribution of each group to the overall CS rate. Group 5 contributed the most (18.62%), followed by Group 2, indicating repeat CS and induced labour as major drivers.

Table 5: Ranking of Group Contributions

Rank	Group	Contribution (%)
1	Group 5	18.62
2	Group 2	12.52
3	Group 1	3.94
4	Group 4	3.84
5	Group 10	3.84
6	Group 6	0.89
7	Group 8	0.89
8	Group 3	0.79
9	Group 7	0.69

Table 5 ranks the Robson groups based on their contribution to the overall CS rate. Group 5 and Group 2 were the leading contributors, emphasizing the importance of targeting these groups for intervention.

Table 6: Analysis of Robson Group 2

	Total	CS	CS Rate (%)
Group 2	200	127	63%
Foleys + oxytocin	25	13	52%
Foleys + Miso	150	100	66.67%
Foleys + Prostin	15	8	53.33%
Oxytocin	10	6	60%
Total	**200**	**127**	

Table 6 analyzes Group 2 in detail. Induced labour cases had a high CS rate, particularly with misoprostol, suggesting a need to review induction protocols.

Table 7: High-Risk vs. Low-Risk Groups

Category	Groups Included	CS Trend
High Contributors	5, 2, 1	Very High
Moderate Contributors	4, 10	Moderate
Low Contributors	3, 6, 7, 8, 9	Low

Table 7 categorizes Robson groups based on their contribution to CS rates. High-risk groups, particularly Groups 5 and 2, account for the majority of caesarean sections and should be prioritized for intervention strategies.

Discussion

The present study, conducted at Government Victoria Hospital, Visakhapatnam, a tertiary referral centre in Andhra Pradesh, reports a caesarean section rate of 45.8%. This is substantially higher than the 10–15% threshold recommended by the WHO, beyond which further reductions in maternal and neonatal mortality are not evident.[9] The elevated rate observed in this study is comparable with findings from other tertiary care institutions across India, such as studies from Kolkata (43.13%), Mumbai (46.76%), and Northern India (43.6%).[10-12] These consistently high rates reflect the referral nature of tertiary hospitals, which cater predominantly to high-risk pregnancies. Furthermore, regional data from Andhra Pradesh and Telangana, which report CS rates of 40.1% and 58.0% respectively, corroborate the higher institutional rates observed in this study.[13]

Robson Group 5 (previous caesarean section, singleton, cephalic, ≥37 weeks) emerged as the largest contributor to the overall CS rate (18.62%) with an extremely high within-group CS rate (98.95%). This finding is consistent with multiple Indian studies that have identified Group 5 as the major driver of increasing CS rates, contributing between 28% and 54% in different settings. [14-18] The predominance of repeat caesarean sections is largely influenced by institutional policies and clinical caution regarding uterine rupture. In the present study, elective repeat CS at 38 weeks without awaiting spontaneous labour further amplifies this trend. Evidence suggests that encouraging TOLAC (Trial of Labour after Caesarean), when appropriately selected, can significantly reduce repeat CS rates and should be considered a key intervention. [13,16,18]

Robson Group 2 (nulliparous, induced or pre-labour CS) was the second largest contributor (12.52%), with a notably high within-group CS rate (63.5%).A significant proportion of these cases followed induction of labour, particularly with Foley's catheter and prostaglandins, which demonstrated higher failure rates leading to CS. Similar findings have been reported in studies from Central and Western India, as well as recent literature, where Group 2 contributes significantly to overall CS rates due to increased induction practices and associated risk of failed labour.[19-21] These findings highlight the importance of strict adherence to induction protocols, appropriate patient selection, and careful monitoring to reduce unnecessary operative interventions.

Robson Group 1 (nulliparous, spontaneous labour) contributed 3.94% to the overall CS rate, with a within-group CS rate of 21.39%. This rate is relatively lower compared to other studies, such as that by Konar et al., which reported a higher within-group CS rate of 41.75%.[10] Differences may be attributed to variations in labour management practices and patient characteristics. Optimizing labour management through the use of partographs, adherence to evidence-based definitions of labour progress, and avoidance of early interventions can further reduce CS rates in this group.

Robson Group 4 (multiparous, induced or pre-labour CS without previous CS) contributed 3.84% with a within-group CS rate of 41.05%. This reflects the growing trend of labour induction even in

multiparous women, which has been associated with increased operative delivery rates. Global evidence, including WHO multicountry analyses, suggests a rising trend in CS rates among induced multiparous women, emphasizing the need for cautious and judicious use of induction in this population.[21]

Robson Group 10 (preterm singleton cephalic pregnancies) also contributed 3.84% to the overall CS rate, with a high within-group CS rate (51.32%). This is indicative of the high-risk nature of preterm deliveries managed at tertiary centres. Studies from Mangalore and Northern India have similarly reported higher contributions from Group 10 due to referral of complicated pregnancies, reinforcing the influence of case mix on institutional CS rates. [12,22]

Groups 6 and 7 (breech presentations) demonstrated very high CS rates (90% and 87.5%, respectively), which is consistent with current obstetric practice trends in India favouring elective CS for breech due to safety concerns.[23] Group 9 (abnormal lie) showed a 100% CS rate, which is expected and aligns with global standards.[23]

In contrast, Robson Group 3 (multiparous, spontaneous labour without previous CS) had the lowest CS rate (3.49%), contributing minimally (0.79%) to the overall CS rate. This finding is consistent with WHO benchmarks and reflects appropriate management of low-risk pregnancies.[9] Similarly, Group 8 (multiple pregnancies) showed a high CS rate (90%), attributable to the high-risk nature of such pregnancies and referral bias in tertiary care settings.[11]

The overall high CS rate in this study can be attributed to several interrelated factors, including increasing maternal age, early detection of fetal distress through continuous electronic fetal monitoring, declining use of instrumental vaginal delivery, rising rates of labour induction, and higher prevalence of comorbidities and high-risk pregnancies. [13,17] These factors have been widely recognized in the Indian context as contributors to the rising trend in caesarean deliveries.

The Robson Ten Group Classification System proves to be a valuable tool in identifying specific groups contributing to the overall CS rate, thereby enabling targeted interventions. In the present study, Groups 5, 2, 1, and 10 were identified as key contributors and potential targets for intervention. Strategies such as promoting TOLAC, implementing standardized and evidence-based induction protocols, optimizing labour management, and strengthening peripheral antenatal care to reduce unnecessary referrals can significantly help in reducing CS rates. Evidence from midwifery-led care models has demonstrated that continuous support and appropriate labour management can substantially lower CS rates, particularly in low-risk groups.[24]

Regular audits using the Robson classification, along with institutional policy reforms, clinician training in operative vaginal delivery, and comprehensive patient counselling regarding vaginal birth after caesarean, are essential to achieve a more balanced and clinically justified CS rate.[7]

Conclusion

The Robson Ten Group Classification System is a simple and effective tool for systematically analysing caesarean section rates and identifying key contributing obstetric groups. The present study highlights that targeted strategies such as reducing primary CS rates, promoting and counselling for VBAC, revising clinical thresholds for diagnosing dystocia and non-reassuring fetal status, and enhancing training in instrumental deliveries and external cephalic version can significantly help in lowering CS rates. Furthermore, standardization of indications for caesarean delivery, implementation of clear institutional protocols, and regular clinical audits are essential measures to ensure rational decision-making and to curb the rising trend of unnecessary caesarean sections in tertiary care settings.

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