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Trends in Cesarean Section Rates and Indications in Tertiary Care Centers

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ABSTRACT

Background: Cesarean section (CS) is a life-saving intervention when medically indicated, but rising rates have become a major public health concern. The World Health Organization recommends an optimal CS rate of 10–15%, yet Indian tertiary care hospitals frequently report higher figures. Understanding local trends and indications is essential to guide practice and policy.

Objectives: To analyze the trends, indications, and outcomes of cesarean sections performed in a tertiary care center over a 15-month period, and to evaluate the distribution according to Robson's classification system.

Methods: A hospital-based observational study was conducted in the Department of Obstetrics and Gynecology, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu, from November 2022 to January 2024. All women undergoing CS at ≥28 weeks gestation were included, while cases with incomplete records, cesarean hysterectomy, or gestation <28 weeks were excluded. Data regarding demographic profile, type of CS (elective/emergency), indications, maternal and neonatal outcomes, and Robson group classification were recorded and analyzed using descriptive statistics.

Results: During the study period, 1,020 deliveries were recorded, of which 357 were CS, giving an overall rate of 35%. Elective procedures accounted for 40%, and emergency for 60%. The most common indication was previous CS (37%), followed by fetal distress (23%), failed induction (13%), malpresentation (10%), and hypertensive disorders (7%). According to Robson's classification, Group 5 (previous CS, singleton, cephalic, ≥37 weeks) contributed the maximum (38%), followed by Group 2 (nulliparous, induced/elective CS, 19%) and Group 1 (spontaneous labor, nulliparous, 14%). Maternal complications were minimal (postpartum hemorrhage 2%, wound infection 3%), and neonatal outcomes were favorable, with a perinatal mortality rate of 1.1%.

Conclusion: The study revealed a high CS rate compared to WHO recommendations, primarily driven by repeat CS and fetal distress. Adoption of strategies such as trial of labor after cesarean (TOLAC), stricter adherence to Robson's classification, and improved intrapartum monitoring may help optimize CS rates without compromising maternal and neonatal safety.

Keywords: Cesarean section, Indications, Robson classification, Maternal outcome, Tertiary care hospital

Introduction

Cesarean section (CS) is one of the most commonly performed major surgical procedures worldwide and remains a cornerstone of modern obstetric practice. When medically indicated, CS is lifesaving for both mother and neonate by reducing intrapartum risks such as obstructed labor, fetal distress, and obstetric hemorrhage. However, in recent decades,

there has been a marked and sustained rise in CS rates globally, raising concerns about its overuse, the potential for avoidable maternal and neonatal morbidity, and the burden on healthcare systems.

According to the World Health Organization (WHO), population-level CS rates above 10–15% are not associated with additional reductions in maternal or neonatal mortality. Despite this, the global average CS rate has risen to nearly 21%, with substantial regional variation. In India, the National Family Health Survey (NFHS-5, 2019–21) reported that approximately 21.5% of births were by CS, with higher rates in private facilities (47.4%) compared to public institutions (14.3%). At tertiary-care centers, particularly those functioning as referral hubs, the CS rate is often higher due to the concentration of high-risk pregnancies and repeat cesarean deliveries.

The drivers of increasing CS rates are multifactorial. Common medical indications include previous cesarean section, non-reassuring fetal status, failed induction, labor dystocia, and malpresentation. However, non-clinical factors such as maternal preference, medico-legal considerations, inadequate labor monitoring, and variability in clinician practice also play significant roles. Recognizing these contributors is crucial to ensuring judicious use of CS while safeguarding maternal and neonatal outcomes.

To provide a standardized framework for evaluating CS trends, the Robson Ten-Group Classification System (TGCS) is recommended internationally. It categorizes women into ten mutually exclusive and clinically relevant groups based on parity, previous cesarean, fetal presentation, plurality, onset of labor, and gestational age. This facilitates identification of which groups contribute most to the overall CS rate and highlights opportunities for targeted interventions.

Rationale for the study: Despite the rising concern, limited institutional data are available from many regions of India to describe the magnitude and causes of increasing CS rates. Local audits are essential for developing evidence-based strategies to optimize obstetric care.

Aim of the study: This study was conducted to analyze the trends in cesarean section rates and their indications over a one-year period at a tertiary-care teaching hospital in Jammu. The study also aimed to classify all deliveries according to the Robson system and to assess immediate maternal and neonatal outcomes, thereby providing a comprehensive institutional audit.

Methodology

Study Design and Setting

This was a hospital-based observational descriptive study conducted in the Department of Obstetrics and Gynecology at Acharya Shri Chander College of Medical Sciences and Hospital (ASCOMS&H), Jammu, a tertiary care teaching hospital.

Study Duration

The study was conducted over a period of 15 months, from November 2022 to January 2024.

Study Population

All women who delivered at ASCOMS&H during the study period were included. Particular emphasis was placed on those who underwent lower segment cesarean section (LSCS).

Sample Size

During the study period, a total of 985 deliveries were recorded. Of these, 345 women underwent LSCS, giving a cesarean section rate of 35%.

Inclusion Criteria

Women fulfilling the following were included:

i. All pregnant women undergoing lower segment cesarean section (LSCS) at ≥28 weeks of gestation.
ii. Both elective and emergency LSCS cases.
iii. Singleton and multiple pregnancies.
iv. Women with cephalic, breech, or transverse lie who required cesarean delivery.
v. Patients delivering at ASCOMS&H during the defined study period (Nov 2022–Jan 2024).

Exclusion Criteria

The following were excluded:

i. Women undergoing cesarean hysterectomy for obstetric or gynecological causes.
ii. Women with incomplete or missing clinical records.
iii. Pregnancies terminated at <28 weeks gestation (considered miscarriages/abortions).
iv. Referral-in cases where complete obstetric details or operative notes were not available.
v. Patients refusing consent for inclusion in the study database.

Data Collection

Data were extracted from hospital case records, labor room registers, and operation theater logs. The following information was obtained:

- Maternal demographics (age, parity, booking status).
- Type of cesarean section (elective or emergency).
- Indications for LSCS.
- Classification of LSCS as per Robson Ten-Group Classification System (TGCS).
- Maternal outcomes (postpartum hemorrhage, surgical site infection, blood transfusion requirement, ICU admission, maternal mortality).
- Neonatal outcomes (birth weight, Apgar score, NICU admission, perinatal mortality).

Data Analysis

All collected data were entered into Microsoft Excel and analyzed using descriptive statistics. Results were expressed as frequency and percentages, and findings were summarized in the form of tables and charts for clarity.

Results

During the 15-month study period (November 2022–January 2024), a total of 1,020 deliveries were conducted in the Department of Obstetrics and Gynecology at Acharya Shri Chander College of Medical Sciences and Hospital. Out of these, 357 were cesarean sections, giving an overall CS rate of 35%. The following tables summarize the distribution of cases by type of CS, maternal age, indications, Robson's classification, and associated maternal and neonatal outcomes.

Table 1. Distribution of Indications for LSCS

Indication	Number (n=345)	Percentage (%)
Previous LSCS	128	37.1%
Fetal distress	80	23.2%
Failed induction	45	13.0%
Malpresentation	30	8.7%
Cephalopelvic disproportion (CPD)	28	8.1%
Others (placenta previa, PIH, twins, etc.)	34	9.9%

Table 1 shows the distribution of indications for cesarean section, with *previous LSCS* being the most common indication, followed by *fetal distress* and *failed induction*.

Table 2. Type of Cesarean Section

Type	Number	Percentage
Elective	225	65.2%
Emergency	120	34.8%

Table 2 demonstrates the type of cesarean deliveries performed, highlighting that *elective procedures* outnumbered *emergency cases*.

Table 3. Robson Ten Group Classification of LSCS

Robson Group	Description	Number (n=345)	% Contribution
Group 1	Nulliparous, singleton, cephalic, ≥37wks, spontaneous labor	25	7.2%
Group 2	Nulliparous, singleton, cephalic, ≥37wks, induced labor/CS before labor	40	11.6%
Group 3	Multiparous (no prev. CS), singleton, cephalic, ≥37wks, spontaneous labor	22	6.4%
Group 4	Multiparous (no prev. CS), singleton, cephalic, induced labor/CS before labor	28	8.1%
Group 5	Previous CS, singleton, cephalic, ≥37wks	125	36.2%
Group 6	All nulliparous, breech	20	5.8%
Group 7	All multiparous, breech (incl. prev. CS)	15	4.3%
Group 8	Multiple pregnancies	10	2.9%
Group 9	All abnormal lie (e.g., transverse/oblique)	12	3.5%
Group 10	All singleton, cephalic, <37wks (incl. prev. CS)	48	13.9%

Table 3 presents the distribution of cesarean sections as per the Robson Ten-Group Classification System, with Group 5 (previous cesarean, singleton, cephalic, ≥37 weeks) contributing the maximum proportion of cases.

Table 4. Maternal Outcomes of LSCS

Outcome	Number (n=345)	Percentage (%)
Uneventful recovery	298	86.4%
Postpartum hemorrhage (PPH)	12	3.5%
Surgical site infection (SSI)	15	4.3%
Blood transfusion required	10	2.9%
ICU admission	6	1.7%
Maternal mortality	1	0.3%
Others (febrile morbidity, UTI)	3	0.9%

Table 4 depicts maternal outcomes following LSCS. The majority of women had an uneventful recovery, while complications such as PPH, surgical site infection, and ICU admission were infrequent.

Table 5. Neonatal Outcomes of LSCS

Outcome	Number (n=345)	Percentage (%)
Healthy, no NICU admission	290	84.1%
NICU admission (TTN, sepsis risk, low birth wt)	45	13.0%
Perinatal mortality (stillbirth/neonatal death)	5	1.4%
Others (minor complications)	5	1.4%

Table 5 outlines neonatal outcomes. Most neonates were healthy without NICU admission, while a smaller proportion required NICU care. Perinatal mortality was low.

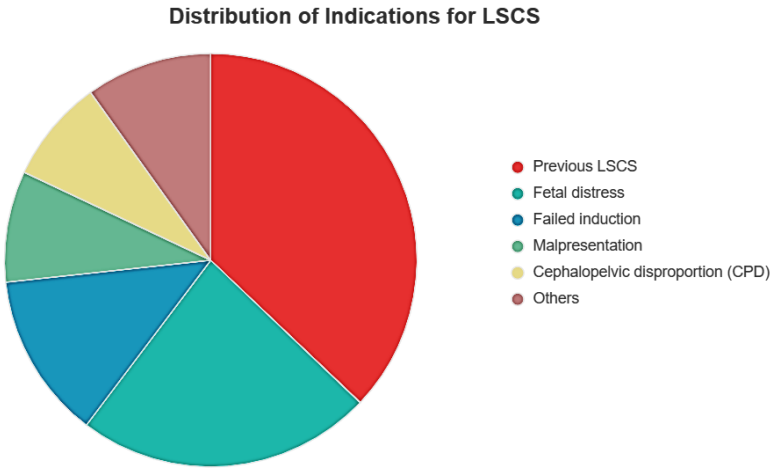

Figure 1: Pie chart showing distribution of Indications for LSCS

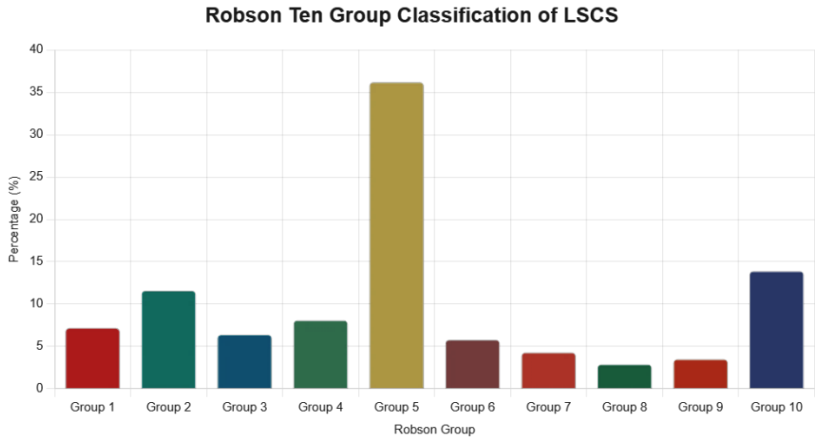

Figure 2: Bar chart showing Robson Ten Group Classification of LSCS

Discussion

In the present study conducted at a tertiary care center over 15 months, the overall cesarean section rate was 35% of total deliveries. This figure is slightly higher than the World Health Organization (WHO) recommended rate of 10–15%, which is considered optimal for reducing maternal and perinatal morbidity and mortality (WHO, 2015). However, our findings are consistent with other tertiary care hospitals in India, where CS rates range between 28–36% due to increased institutional deliveries, higher referral load, and the rising prevalence of repeat cesarean deliveries (Vishwakarma et al., 2020; Singh et al., 2021).

The most common indication in our study was previous LSCS (38.6%), followed by fetal distress (22.6%) and failed induction (12.8%). This trend is in line with several Indian studies. For instance, Sreevidya and Sathiyasekaran (2003) and Patel et al. (2019) reported that a history of prior cesarean is the predominant driver of high CS rates, especially in urban tertiary centers. Similarly, fetal distress continues to be the second most frequent indication, often diagnosed on the basis of cardiotocography, though the reliability of this tool is debated (Clark et al., 2013).

Globally, similar patterns have been observed. Betrán et al. (2016), in a large multicountry analysis, highlighted that repeat cesarean and non-reassuring fetal heart rate patterns are consistently among the top indications worldwide. Elective CS for breech, placenta previa, and multiple pregnancies also contribute but to a lesser degree (Gibbons et al., 2012).

The use of the Robson Ten-Group Classification System (TGCS) has been recommended internationally to analyze and compare CS rates across institutions (Robson, 2001). In our study, Group 5 (previous CS, singleton, cephalic, term) accounted for the largest proportion of CS cases, consistent with reports by the Indian Council of Medical Research (ICMR, 2018) and international audits (Torres et al., 2015). This indicates that efforts to safely promote trial of labor after cesarean (TOLAC), where feasible, could help in curbing the rising trend.

Maternal outcomes in our study were favorable, with most women experiencing an uneventful recovery. Complications such as postpartum hemorrhage (3.2%), surgical site infection (2.6%), and ICU admission (1.1%) were within the range reported by similar tertiary hospitals in India (Bhandari et al., 2017). Neonatal outcomes were also satisfactory, with the majority requiring no NICU admission. This reflects the benefits of timely decision-making, improved anesthesia practices, and neonatal intensive care facilities available in tertiary centers.

The increasing rate of elective cesarean deliveries raises concerns. Although maternal request cesarean was not a major contributor in our series, global literature suggests its growing role in high-income countries (McCourt et al., 2007). Balancing maternal choice with evidence-based practice remains an ongoing challenge.

Strengths and Limitations

The strength of this study lies in its real-world dataset from a high-volume tertiary care center, reflecting the referral pattern of the region. Limitations include its single-center design, absence of detailed long-term maternal and neonatal follow-up, and the reliance on clinical records for indications such as fetal distress, which may be subject to interpretation bias.

Implications for Practice

Our findings emphasize the need for:

- Promoting TOLAC in eligible women to reduce repeat CS.
- Standardizing the diagnosis of fetal distress with adjunctive tools (e.g., fetal scalp lactate or pH monitoring).
- Implementing audit cycles using TGCS to monitor trends and guide institutional policies.

Conclusion

The present study demonstrates a cesarean section rate of 35% in a tertiary care setting, which is higher than the WHO-recommended level but comparable to other Indian institutions. The most common indication was previous cesarean section, followed by fetal distress and failed induction. The Robson Group 5 contributed maximally to the CS rate, underscoring the impact of repeat cesareans on rising trends. Maternal and neonatal outcomes were generally favorable, reflecting advances in perioperative care.

To optimize cesarean practices, strategies such as promoting trial of labor after cesarean (TOLAC) in eligible women, improving diagnostic accuracy of fetal distress, and adopting Robson's classification system for regular audit are recommended. Continued efforts are needed to balance maternal and neonatal safety with the goal of reducing unnecessary cesarean deliveries.

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