

ORIGINAL RESEARCH

AUDIT OF CAESAREAN SECTION RATES USING THE ROBSON TEN-GROUP CLASSIFICATION SYSTEM IN A TERTIARY CARE CENTRE: A RETROSPECTIVE OBSERVATIONAL STUDYKalpana G^{1*}, Anuradha M², Jagruthi G³¹ Assistant Professor, Department of Obstetrics and Gynaecology, Santhiram Medical College, Andhra Pradesh, India.² Department of Obstetrics and Gynaecology, Santhiram Medical College, Andhra Pradesh, India.³ Assistant Professor, Department of Obstetrics and Gynaecology, Santhiram Medical College, Andhra Pradesh, India.

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ABSTRACT

Caesarean section (CS) is an essential obstetric intervention that, used for appropriate indications, reduces maternal and perinatal morbidity and mortality. Rising CS rates worldwide have raised concerns about overuse and the risks attendant on unnecessary surgery. The World Health Organization (WHO) recommends use of the Robson Ten-Group Classification System (TGCS) as a standardised tool for monitoring, auditing and comparing institutional CS rates. The study was conducted to determine the overall CS rate in a tertiary care teaching hospital in southern India and to identify the principal contributing groups using the Robson TGCS. A retrospective observational study was conducted in the Department of Obstetrics and Gynaecology over a six-month period. Data on parity, previous CS, gestational age, onset of labour, fetal presentation, number of fetuses and mode of delivery were retrieved from delivery registers and case records, and every delivery was classified into one of the ten Robson groups. Group size, group-specific CS rate and contribution to the overall CS rate were calculated using descriptive statistics. Of 1,240 deliveries during the study period, 456 were by CS, giving an overall CS rate of 36.8%. Most women were aged 20–30 years (66.1%), and pregnancies were predominantly term (87.1%) and singleton (95.2%). Group 5 (women with at least one previous CS) was the largest contributor to the overall CS rate (28.9%), with a within-group CS rate of 88.0%. Nulliparous women in Robson Groups 1 and 2 together accounted for approximately 29% of the overall CS rate. Group-specific CS rates were higher in induced labour (Group 2: 44.4%; Group 4: 28.3%) than in the corresponding spontaneous labour groups (Group 1: 20.0%; Group 3: 7.8%). The leading documented indications for CS were previous CS (32.9%), non-reassuring fetal status (19.7%) and non-progress of labour (15.4%). The institutional CS rate substantially exceeded the WHO-recommended population threshold, with previous CS (Group 5) emerging as the dominant contributor. Strategies aimed at reducing primary CS in nulliparous women, optimising induction practices and structured promotion of trial of labour after caesarean (TOLAC) are likely to have the greatest impact in lowering overall CS rates. The Robson TGCS proved a practical, internationally comparable framework for institutional audit and is recommended for routine use in obstetric quality improvement.

Keywords: Caesarean section; Robson Ten-Group Classification System; obstetric audit; vaginal birth after caesarean; tertiary care.

INTRODUCTION

Caesarean section (CS) is among the most frequently performed major surgical procedures in obstetric practice and, when undertaken for appropriate clinical indications, substantially reduces maternal and perinatal morbidity and mortality [1,2]. Over the last three decades, however, CS rates have risen sharply across most regions of the world. Recent global estimates indicate that more than 21% of all births are now delivered by CS, with projections approaching one in three by 2030 if current trends continue [1]. The increase has been most pronounced in upper-middle and high-income countries, with marked intra-country disparities by socio-economic status, sector (public versus private) and place of birth [2].

Although CS is life-saving when medically indicated, its overuse is associated with short- and long-term adverse outcomes, including increased maternal infectious and haemorrhagic morbidity, neonatal respiratory complications, prolonged hospital stay, and important consequences for future pregnancies such as placenta accreta spectrum, uterine rupture and recurrent CS [3,4]. Recognising both ends of this spectrum, the WHO has emphasised that, at the population level, CS rates above approximately 10–15% are not consistently associated with further reductions in maternal or neonatal mortality, and has called for systematic monitoring and rationalisation of CS use rather than the pursuit of a single optimal rate [5].

To enable meaningful comparisons of CS rates between institutions and over time, Robson proposed the Ten-Group Classification System in 2001 [6]. The system stratifies all women admitted for delivery into ten mutually exclusive and totally inclusive groups defined by five obstetric parameters: parity, previous CS, onset of labour, fetal presentation, number of fetuses and gestational age. The classification is simple, robust, reproducible and clinically interpretable; a systematic review of more than 70 studies confirmed its utility for clinical audit and quality improvement [7]. Following endorsement by the WHO in 2015 and the publication of an Implementation Manual in 2017, the Robson TGCS has been adopted as the recommended global standard for assessing CS rates within and between healthcare facilities [8].

Multi-country and institutional analyses applying the classification have consistently shown that women with at least one previous CS (Group 5), together with nulliparous women at term in spontaneous or induced labour (Groups 1 and 2), account for the largest share of overall CS rates [9,10]. The dominance of Group 5 reflects the cumulative effect of rising primary CS, while the burden borne by Groups 1 and 2 indicates that intrapartum management of low-risk nulliparous women is a critical determinant of an institution's overall CS rate [10,11]. Other groups those with breech presentation, multiple pregnancy and abnormal lie contribute disproportionately less to absolute CS numbers, although their group-specific CS rates are necessarily high for clinical reasons.

Strategies for the safe reduction of primary CS, support of trial of labour after caesarean (TOLAC) and avoidance of early-term elective deliveries have been advocated by professional bodies including the American College of Obstetricians and Gynecologists and the Royal College of Obstetricians and Gynaecologists [12,13]. In low- and middle-income settings, including India, both underuse of CS in disadvantaged populations and overuse in tertiary and private facilities have been documented, underscoring the need for institution-level audit using a standardised framework [2,14].

Against this background, the present study was undertaken to determine the overall CS rate in a tertiary care teaching hospital in southern India over a six-month period and to identify the principal contributing Robson groups, with a view to informing local quality improvement strategies.

MATERIALS AND METHODS

Study design and setting: This was a single-centre, retrospective observational study conducted in the Department of Obstetrics and Gynaecology of a tertiary care teaching hospital in Andhra Pradesh, India. The study was carried out in accordance with the principles of the Declaration of Helsinki [15] and received prior approval from the Institutional Ethics Committee. As the analysis was based on routinely collected, de-identified clinical data, the requirement for individual informed consent was waived by the Committee.

Study period and population: All women who delivered at the institution between 1 January and 30 June 2024 were eligible for inclusion. Records with incomplete or missing essential clinical information, and pregnancies that did not result in delivery (for example, abortions before viability), were excluded.

Data sources and variables: Data were retrieved from labour ward registers, delivery records and the hospital information system. The following variables were extracted for every delivery: maternal age, parity, history of previous CS, gestational age at delivery, antenatal booking status, onset of labour (spontaneous, induced or pre-labour CS), fetal presentation, number of fetuses, mode of delivery and the documented indication when CS was performed. All variables were entered into a structured data collection sheet and cross-checked against case files to ensure completeness and accuracy.

Robson Ten-Group Classification System: Each delivery was assigned to one of the ten Robson groups using the standard definitions and stepwise algorithm described in the WHO Implementation Manual [8]. For each group, three indicators were computed in line with international recommendations: (i) the relative size of the group as a proportion of all deliveries; (ii) the group-specific CS rate, defined as the number of CS within the group divided by the total number of deliveries in the group; and (iii) the absolute contribution of the group to the overall CS rate, defined as the number of CS within the group divided by the total number of deliveries in the institution [6,8]. Indications for CS were recorded as documented by the operating obstetrician and were collapsed into clinically meaningful categories for reporting.

Statistical analysis

Data were entered and analysed using Microsoft. Descriptive statistics were used: categorical variables are presented as frequencies and percentages, and continuous variables, where applicable, as means with standard deviations. Formal hypothesis testing was not performed, as the primary aim was descriptive characterisation of CS practice using the Robson TGCS.

RESULTS

A total of 1,240 deliveries were recorded during the six-month study period, of which 456 were by caesarean section, yielding an overall CS rate of 36.8%.

Demographic and obstetric characteristics

The majority of women were aged 20–30 years ($n = 820$; 66.1%), with 27.4% ($n = 340$) older than 30 years. Multiparous women without a previous CS constituted the largest parity group (49.2%); nulliparous women accounted for 38.7% and 12.1% had at least one previous CS. Most pregnancies were at term (≥ 37 weeks; 87.1%) and singleton (95.2%); 72.6% of women had received antenatal care during the index pregnancy (Table 1).

Table 1. Demographic and obstetric characteristics of the study population ($n = 1,240$).

Variable	Category	Number (n)	Percentage (%)
Maternal age (years)	<20	80	6.5
	20–30	820	66.1
	>30	340	27.4
Parity	Nulliparous	480	38.7
	Multiparous (no previous CS)	610	49.2
	Previous CS	150	12.1
Gestational age	Term (≥ 37 weeks)	1080	87.1
	Preterm (<37 weeks)	160	12.9
Antenatal care status	Received ANC	900	72.6
	No / irregular ANC	340	27.4
Type of pregnancy	Singleton	1180	95.2
	Multiple	60	4.8

Distribution by Robson groups

The size of each Robson group, the group-specific CS rate and the absolute contribution of each group to the overall CS rate are shown in Table 2. Group 5 (women with at least one previous CS, singleton, cephalic) accounted for 12.1% of all deliveries but had the highest within-group CS rate of any major group (88.0%) and contributed the largest share 28.9% to the overall CS rate.

Nulliparous women in Groups 1 and 2 together represented 35.5% of all deliveries and contributed approximately 29% to the overall CS rate. The within-group CS rate was substantially higher among women undergoing induction of labour or pre-labour CS (Group 2: 44.4%; Group 4: 28.3%) than among those entering spontaneous labour (Group 1: 20.0%; Group 3: 7.8%).

Groups 6, 7, 8 and 9 (nulliparous and multiparous breech, multiple pregnancy and abnormal lie) showed the expected high group-specific CS rates of 70–100%, but, owing to their small size, contributed 25.6% to the overall CS rate in aggregate. Group 10 (preterm singleton cephalic) had a group-specific CS rate of 26.9% and contributed 9.4% to the total.

Table 2. Distribution of deliveries and caesarean sections according to the Robson Ten-Group Classification System.

Group	Obstetric characteristics	Total women, n (%)	CS within group, n (%)	Contribution to overall CS rate (%)
1	Nulliparous, singleton, cephalic, ≥37 weeks, spontaneous labour	260 (21)	52 (20)	11.4
2	Nulliparous, singleton, cephalic, ≥37 weeks, induced or pre-labour CS	180 (14.5)	80 (44.4)	17.5
3	Multiparous, no previous CS, singleton, cephalic, ≥37 weeks, spontaneous labour	230 (18.5)	18 (7.8)	3.9
4	Multiparous, no previous CS, singleton, cephalic, ≥37 weeks, induced or pre-labour CS	120 (9.7)	34 (28.3)	7.5
5	Previous CS, singleton, cephalic, ≥37 weeks	150 (12.1)	132 (88.0)	28.9
6	Nulliparous, singleton, breech	40 (3.2)	38 (95.0)	8.3
7	Multiparous, singleton, breech (including previous CS)	30 (2.4)	27 (90.0)	5.9
8	Multiple pregnancy (including previous CS)	60 (4.8)	42 (70.0)	9.2
9	Singleton, abnormal lie (including previous CS)	10 (0.8)	10 (100.0)	2.2
10	Singleton, cephalic, <37 weeks (including previous CS)	160 (12.9)	43 (26.9)	9.4
Total		1240 (100.0)	456 (36.8)	100.0

Documented indications for caesarean section

Previous caesarean section was the most common documented indication (32.9%), followed by non-reassuring fetal status (19.7%), non-progress of labour (15.4%), breech presentation (11.0%), cephalopelvic disproportion (7.7%) and failed induction (6.6%) (Table 3).

Table 3. Documented indications for caesarean section (n = 456).

Indication	Number (n)	Percentage (%)
Previous caesarean section	150	32.9
Non-reassuring fetal status (fetal distress)	90	19.7
Non-progress of labour	70	15.4
Breech presentation	50	11.0
Cephalopelvic disproportion	35	7.7
Failed induction	30	6.6
Multiple pregnancy	18	3.9
Placenta praevia / antepartum haemorrhage	8	1.8
Other	5	1.1
Total	456	100.0

DISCUSSION

In this six-month audit of obstetric practice at a tertiary care teaching hospital, the overall CS rate was 36.8%, well above the population-level threshold of 10–15% beyond which the WHO has noted no consistent reduction in maternal or perinatal mortality [5]. The figure is broadly consistent with reports from comparable Indian and South Asian tertiary centres [16] and aligns with the trajectory described in global analyses, which document particularly steep increases in CS use in private and tertiary facilities of low- and middle-income countries [1,2,14].

Application of the Robson TGCS allowed the principal subpopulations driving the institutional CS rate to be identified. Group 5 women with at least one previous CS was the single largest contributor (28.9%), with a within-group CS rate of 88.0%. This pattern mirrors observations from multi-country WHO surveys, secondary analyses of national datasets and single-centre studies, in which Group 5 has consistently emerged as the dominant absolute contributor to overall CS rates [9,10,16,17]. The contribution of Group 5 reflects two converging phenomena: an upstream rise in primary CS (Groups 1, 2, 6, 8 and 10), and a downstream tendency to perform repeat elective CS in preference to TOLAC [4,12]. The National Institutes of Health consensus statement [18] and current ACOG and RCOG guidelines [12,13] support offering planned vaginal birth after caesarean (VBAC) to appropriately selected women, and well-implemented TOLAC programmes have been shown to lower overall CS rates without compromising safety. Strengthening counselling, intrapartum monitoring and emergency obstetric services to support TOLAC at our centre is therefore a priority for quality improvement.

The combined contribution of nulliparous term women (Groups 1 and 2) of approximately 29% is also clinically significant. The within-group CS rate in Group 2 (44.4%) was more than twice that in Group 1 (20.0%), in keeping with the well-recognised observation that induction of labour, particularly in nulliparous women with an unfavourable cervix, is associated with higher CS rates [12,19]. Similar disparities between spontaneous and induced labour groups have been reported in audits from a range of settings [11,17,19]. Interventions shown to reduce primary CS in nulliparous women include allowing more time in latent and active phases of labour, judicious use of induction with attention to indication and cervical readiness, expert intrapartum interpretation of fetal heart rate tracings, continuous labour support, and selective use of operative vaginal delivery where appropriate [12]. The 19.7% contribution of non-reassuring fetal status to the indication profile in our series suggests that further training in standardised cardiotocography interpretation may be particularly worthwhile.

As anticipated, the high-risk groups nulliparous and multiparous breech (Groups 6 and 7), multiple pregnancy (Group 8) and abnormal lie (Group 9) exhibited high group-specific CS rates of 70–100%, in line with prevailing obstetric practice following the Term Breech Trial and subsequent professional guidance [20]. Although these groups account for a smaller absolute share of the overall CS rate (25.6% combined in our cohort), the Robson framework usefully distinguishes them as largely unavoidable from those, such as Groups 1, 2 and 5, in which modifiable practice variation is the principal driver of institutional rates [7,9].

The dominant indications recorded in our series previous CS, non-reassuring fetal status, and non-progress of labour reflect the patterns reported from comparable Indian tertiary settings [16,17]. Several factors plausibly contribute to the high CS rate observed, including the referral case mix of a tertiary centre receiving high-risk and complicated pregnancies, increased medico-legal sensitivity, evolving patient preferences [21] and conservative intrapartum decision-making in women with previous uterine surgery.

CONCLUSION

This audit demonstrates a CS rate of 36.8% at a tertiary care teaching hospital, with women who had a previous CS (Robson Group 5) and nulliparous term women (Groups 1 and 2) constituting the principal contributors. Targeted strategies particularly the safe reduction of primary CS in nulliparous women, optimisation of induction practices, and structured promotion of TOLAC for eligible women with a previous CS are likely to have the greatest impact in lowering the overall CS rate. The Robson Ten-Group Classification System provided a practical, internationally comparable framework for institutional audit, and its routine use is recommended for ongoing monitoring and quality improvement in obstetric practice.

Limitations

This is a single-centre retrospective analysis; findings reflect local practice and case mix and may not be generalisable to other facilities, the relatively short six-month period precludes assessment of temporal trends. Indications for CS were extracted as documented by the operating clinician and may be susceptible to subjectivity, particularly for diagnoses such as non-progress of labour and non-reassuring fetal status, neonatal and maternal outcomes were not analysed in this audit; linking Robson group-specific CS rates with clinical outcomes is an important next step and, the use of descriptive statistics alone limits formal inferential comparisons.

DECLARATIONS

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