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Dr. Poonam TM

Assistant Professor Department of
Obstetrics and Gynecology, S
Nijalingappa Medical College and
HSK Hospital, Bagalkot,
Karnataka, India

Dr. Ashalata Mallapur

Professor and HOD, Department
of Obstetrics and Gynecology, S
Nijalingappa Medical College and
HSK Hospital, Bagalkot,
Karnataka, India

Dr. K Krishna Keerthi

Junior resident, Department of
Obstetrics and Gynecology, S
Nijalingappa Medical College and
HSK Hospital, Bagalkot,
Karnataka, India

Corresponding Author:

Dr. Poonam TM

Assistant Professor Department of
Obstetrics and Gynecology, S
Nijalingappa Medical College and
HSK Hospital, Bagalkot,
Karnataka, India

A study to analyse the caesarean section rate using Robson's ten group classification system-a retrospective study

Poonam TM, Ashalata Mallapur and K Krishna Keerthi

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Abstract

Background: The global rise in Cesarean Section (CS) rates is a significant public health concern, as rates exceeding the recommended 10-15% are not associated with improved maternal or neonatal outcomes. The World Health Organization (WHO) advocates for the use of the Robson Ten-Group Classification System (TGCS) to standardize the monitoring and analysis of CS rates, allowing for targeted quality improvement.

Objective: This retrospective study aimed to analyze the institutional CS rate at a tertiary care teaching hospital using the Robson TGCS, identify the major contributing groups, analyze important indicators, and suggest practical strategies for optimizing delivery outcomes.

Methods: The study was conducted retrospectively at the Department of Obstetrics and Gynecology at S N Medical College and HSK Hospital. Data for all pregnant women who delivered past the period of viability (>28 weeks) between January 2024 and December 2024 (N=1427 total deliveries) were collected from hospital registries and case files. Deliveries were classified into the ten mutually exclusive Robson groups, and relative CS rates and contributions to the overall CS rate were calculated.

Results: The overall institutional Cesarean Section rate was 62.3%, significantly exceeding the WHO recommendation. Group V (multiparous, ≥ 1 previous CS, singleton, cephalic, term) was the largest contributor, accounting for 28.24% of all deliveries and 45.33% of all CSs (CS rate: 99.75%). Group II (nulliparous, singleton, cephalic, term, induced/pre-labor CS) was the second largest contributor (19.41% of deliveries, 26.88% of CSs; CS rate: 86.28%). Groups I and III (spontaneous labor, low-risk) showed appropriately low CS rates (8.51% and 1.49%, respectively) and contributed significantly to vaginal deliveries. The leading indications for CS were Previous Cesarean (45.33%) and Fetal Distress (20.25%).

Conclusion: The institutional CS rate is alarmingly high, primarily driven by the high CS rate and large size of Robson Group V (previous CS) and Group II (induced nulliparous women). Targeted interventions, including promoting Trial of Labor After Cesarean (TOLAC/VBAC) to reduce the CS rate in Group V, and strict adherence to evidence-based labor induction protocols with adequate time for labor progression to reduce the primary CS rate in Group II, are critical steps to reduce the overall institutional CS rate. Improved, judicious intrapartum fetal monitoring may also help mitigate overdiagnosis of fetal distress.

Keywords: Robson classification, cesarean section rate, Robson ten-group classification system (TGCS)

Introduction

In everyday obstetric practice, caesarean sections are a common surgery. The rates of cesarean deliveries have gone up during the last many years ^[1]. A major public health concern in recent decades has been the global increase in the number of cesarean sections. Although a cesarean delivery can save a life when medically necessary, doing it excessively without a valid reason raises the risk of complications for both the mother and the newborn ^[2]. There are many indications for caesarean section, like malpresentation, abnormal pelvis & placenta previa.

Furthermore, placenta previa, placenta accreta, and uterine rupture are linked to higher risks in situations of repeated CSs ^[3]. According to the WHO, cesarean rates over 10-15% are not linked to lower rates of maternal or newborn mortality ^[4]. But the rate has been far greater in many countries, including India. According to the results of the National Family Health Survey (NFHS-5), the rate of cesarean sections in India is 21.5%, whereas the rate in private hospitals is 47.4% ^[5].

The World Health Organization proposed the Robson's Ten Group Classification, which is straightforward and readily reproducible ^[6, 7, 8], to allow for consistent analysis and survey of cesarean rates across healthcare facilities & areas.

This classification was created in 2001 and incorporates obstetric criteria such as parity, labor start, gestational age, presentation, and number of fetuses to divide all pregnant women into ten mutually exclusive and completely inclusive groups [9]. It enables a thorough, methodical examination of CS rates within every clinically significant group and aids in pinpointing areas where needless CSs might be cut. Our study is a retrospective type of study done at a teaching hospital. To analyse the caesarean rates using Robson’s ten-group classification system. Our study aims to identify the role of each group in the total cesarean rate, analyze important indicators, and suggest practical strategies to enhance delivery results.

Methodology

Our research was carried out at a teaching hospital that provides tertiary treatment in the Obstetrics and Gynecology Department. Our study's inclusion criteria were

1. All pregnant ladies who had crossed the period of viability (>28 weeks) delivered during January 2024 to December 2024 were enrolled.
2. All unbooked and referred cases are being evaluated for elective or emergency caesarean section.

Exclusion criteria

1. Clinically diagnosed ruptured uterus
2. Confirmed cases of ruptured uterus by laparotomy

Information was obtained from the maternity and surgery hospital registries as well as the case files of every woman who gave birth at the institute between January 2024 and December 2024. Data from the medical record section for every delivery that took place at S N Medical College and HSK Hospital was checked and validated with data from all other data sources. Informed consent was taken and the ethical clearance was obtained from the institute.Our study

1. The parity, whether nulliparous or multiparous with or without the preceding section.
2. When labor begins, whether it is induced, spontaneous, or prelabor.
3. The gestational age, whether term or premature.
4. The fetus is breech and cephalic.
5. One or more fetuses.

The pregnant women are classified according to Robsons classification i.e.

The Ten Group Classification System by Robson	
Group	Description
Group 1	Women who are nulliparous, have a single cephalic pregnancy, and are in spontaneous labor at ≥37 weeks gestation
Group 2	Women who are nulliparous and had a single cephalic pregnancy that is at least ≥37 weeks along and were either delivered by caesarean section prior to labor or had labor induced
Group 3	Multiparous women with a single cephalic pregnancy, ≥37 weeks of gestation, spontaneous labor, and no prior uterine scarring
Group 4	Multiparous women with a single cephalic pregnancy, ≥37 weeks gestation, no prior uterine scarring, who either had labor induced or were delivered via caesarean section prior to labor
Group 5	Every multiparous woman has a single cephalic presentation at least ≥37 weeks of gestation and at least one prior uterine scar
Group 6	Every woman who is nulliparous and has one breech pregnancy
Group 7	Every multiparous woman who has had one breech pregnancy, including those who have had uterine scarring in the past
Group 8	Every woman who has had more than one pregnancy, including those who have had uterine scarring in the past
Group 9	Every woman who has had a single pregnancy with an oblique or transverse lie, including those who have had uterine scarring in the past
Group 10	Every woman with a single cephalic pregnancy that is less than 37 weeks along, including those who have had uterine scarring in the past

The mode of delivery, normal delivery or caesarean delivery analysed, and the data was used to calculate the relative rates of caesarean in each category.

Results

In our study total deliveries conducted were 1427. Table 1 and Graph 1 analyze the Ranking of the contribution of caesarean section of individual groups to overall deliveries, and the caesarean section rate in each group. Group V, which includes previous caesarean, single cephalic, was the highest contributor to caesarean section, representing

28.24% of all deliveries. This reflects a large burden of repeat cesareans and highlights the need for better VBAC policies. Group II (nulliparous, induced or pre-labor CS) contributed 239 cases (16.75%), Groups IV and X followed, each contributing just over 6%. Groups I and III (spontaneous labor, term, singleton cephalic) contributed minimally, indicating that most spontaneous labor cases resulted in vaginal births. Group IX (abnormal lie) had only 1 CS, as expected due to its rarity. Table 2 analyses the contribution of Robson group to vaginal deliveries. In our study, Group III (multiparous, spontaneous

labor) was the highest contributor: 199 Vaginal deliveries, followed by Group I (nulliparous, spontaneous labor) contributed 129 cases, showing good vaginal birth rates in low-risk nulliparas. Group X (singleton cephalic, <37 weeks) contributed 115 vaginal deliveries, indicating that many preterm pregnancies were managed vaginally. Groups V and IX had the lowest Vaginal delivery contributions.

According to Robson's classification, Table 3 examined the ranking based on the relative size of each individual group and the rate of cesarean sections in each individual group. Group V: Extremely high CS rate (99.75%) and the largest group size (28.31%) made it the biggest contributor to total CS (45.33%). Group II: High CS rate (86.28%) and size made it the second

largest contributor.

Group I vs. III: Though similar in population size (9.88% vs. 14.16%), Group I had a significantly higher CS rate, suggesting more intervention in nulliparas. Groups VI-VIII (breech, multiple pregnancies): Small in size but with high CS rates (>75%), aligning with clinical expectations.

The indications leading to cesarean sections are examined in Table 4 and Graph 5. According to the results in Robson Group V, the most prevalent indication in the current study is Previous CS (45.33%). One in five cesarean sections were caused by fetal distress, which equates to urgent intrapartum fetal monitoring. CS requests from mothers are still comparatively low (1.12%).

Table 1: Ranking of contribution of caesarean of individual group to total number of deliveries. Caesarean rate in each group (A/Total deliveries*100 (n = 1427))

Rank	Group classification	In every group, caesarean	Contribution of each group's caesarean section to total deliveries, or the CS rate for each group (%)
1	V	403	28.24
2	II	239	16.75
3	IV	90	6.31
4	X	89	6.24
5	VII	22	1.54
6	VI	17	1.19
7	VIII	13	0.91
8	I	12	0.84
9	III	3	0.21
10	IX	1	0.07

Table 2: Shows how each group's VD contribution to total deliveries is ranked. VD rate (A/Total deliveries) in each group*100) (n = 1427)

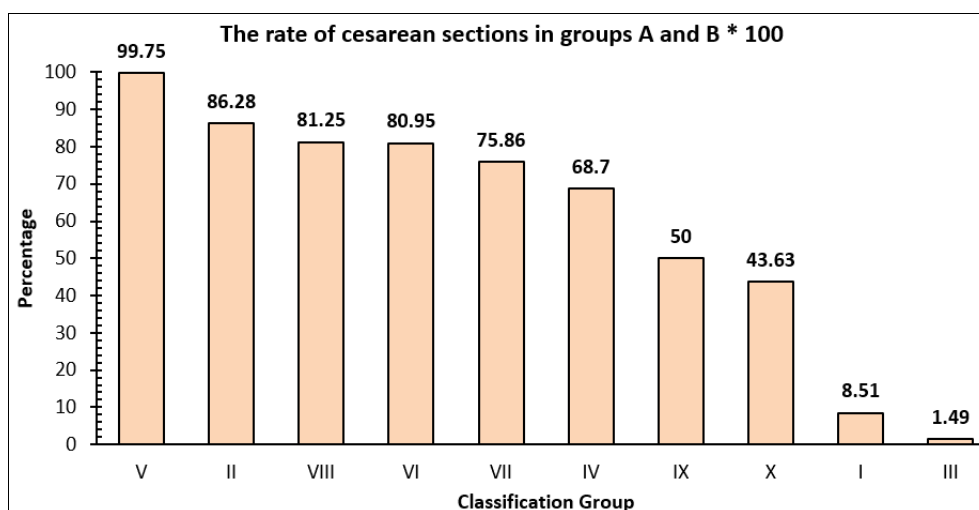
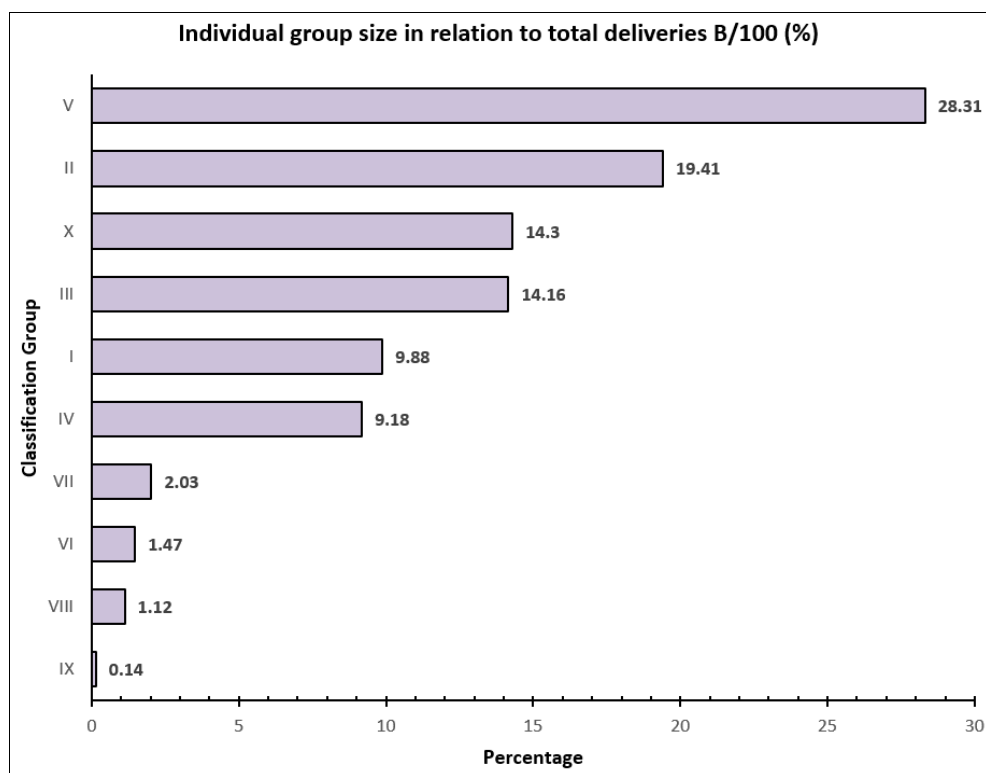
Rank	Group Classification	VD in each GROUP	Each group's VD contribution to the overall deliveries.VD rate (%) for each group
1	III	199	13.95
2	I	129	9.04
3	X	115	8.06
4	IV	41	2.87
5	II	38	2.66
6	VII	7	0.49
7	VI	4	0.28
8	VIII	3	0.21
9	V	1	0.07
10	IX	1	0.07

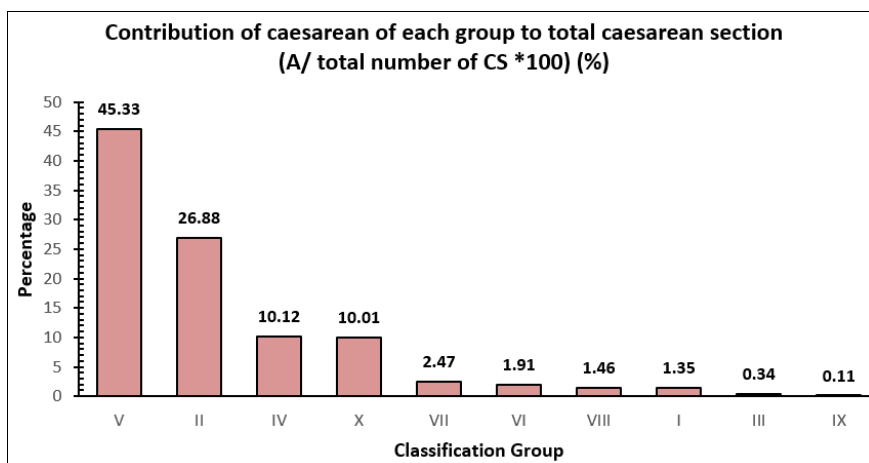
Table 3: Robson's classification is used to rank the groups based on their relative sizes and the rate of cesarean sections in each group.

Classification Group	Number of CS in each group(A)	Each group's number of deliveries (B)	Each group's cesarean rate (A/B*100)	Size of each category in relation to the total deliveries (B/100) %	Each group's cesarean contribution to the overall number of deliveries (A/total caesarean*100) %	Each group's cesarean contribution to the overall number of deliveries Each group's Caesarean rate (A/Total deliveries*100) %
I	12	141	8.51	9.88	1.35	0.84
II	239	277	86.28	19.41	26.88	16.75
III	3	202	1.49	14.16	0.34	0.21
IV	90	131	68.7	9.18	10.12	6.31
V	403	404	99.75	28.31	45.33	28.24
VI	17	21	80.95	1.47	1.91	1.19
VII	22	29	75.86	2.03	2.47	1.54
VIII	13	16	81.25	1.12	1.46	0.91
IX	1	2	50	0.14	0.11	0.07
X	89	204	43.63	14.3	10.01	6.24

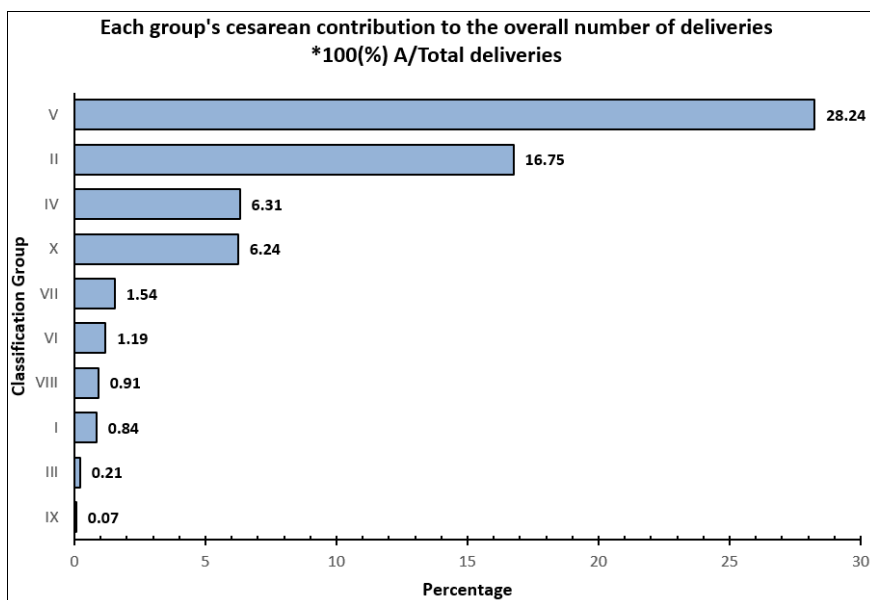
Table 4: This study's indications for cesarean sections (N = 889)

Indications	Number	%
Previous caesarean	403	45.33
Distress of fetus	180	20.25
CPD	45	5.06
Breech	39	4.39
NPOL	35	3.94
Post Datism	34	3.82
Failed Induction	32	3.6
Contracted Pelvis	32	3.6
HTN	28	3.15
Others	21	2.36
Abruption	17	1.91
Placenta Previa	13	1.47
Maternal Request	10	1.12
Total	889	100

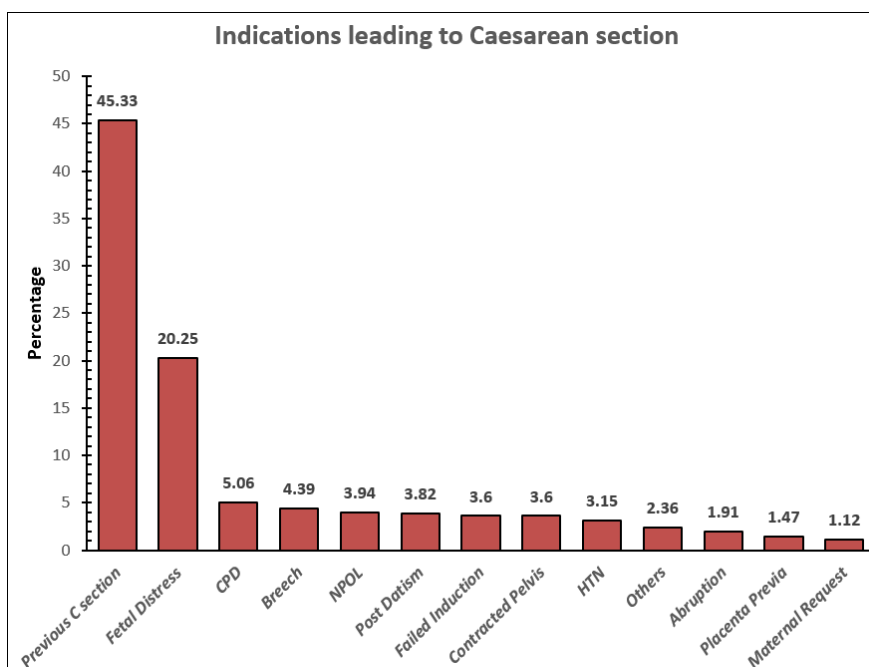
**Graph 1:** Rate of caesarean in individual group (A/B*100)**Graph 2:** Relative size of each group B/Total deliveries *100 (%)



Graph 3: Contribution of caesarean of individual group to total caesarean A/Total caesarean section *100 (%)



Graph 4: The percentage of cesarean deliveries in each group, or the caesarean rate in each group, is calculated as follows: A/Total number of deliveries * 100 (%)



Graph 5: Indications leading to Caesarean section in this study (N = 889)

Discussion

The current study thoroughly assessed the caesarean section rate at a tertiary care teaching institution using the Robson ten-group categorization System (TGCS). The overall cesarean rate in our sample was 62.3%, which is significantly higher than the 10-15% WHO guideline rate [4]. The necessity of performing caesarean sections on unambiguous indications is shown by this observation.

The largest contributor to the CS rate was Group V, which included women with a history of CS, singleton cephalic, and term pregnancies. They accounted for 28.24% of all institutional births and 45.33% of all cesarean deliveries. This is consistent with research conducted in both high- and low-income nations [2, 10], as well as a study by Hitendrasing Rajput *et al* [11]. Ssennuni *et al.*'s work in Robson group 3, on the other hand, was the most important contributor [12].

Robson group 2 was found to be a significant factor to the caesarean rate [13] in a related study carried out in Nepal by Gautam *et al.* Reduced primary caesarean sections and effective VBAC (vaginal birth after caesarean) contribute to lower caesarean rates in this population [14, 15, 16]. The FLAMM score contributes to a decrease in cesarean deliveries [16]. This need ongoing fetal and maternal monitoring. Studies by S. Gaddappa *et al* [14], V. Das *et al.* [15], and A. Ray *et al* [17] show similar findings, with group 5 having a high rate of cesarean sections.

Group II (nulliparous, singleton cephalic, term pregnancies who were either induced or had previous caesarean was the second major contributor, with a CS rate of 86.28% and a 26.88% share of total CSs. This high rate highlights potential overuse of labor induction and elective cesareans in low-risk nulliparous women [24]. Similar trends have been reported in multiple Indian and international studies [18, 19, 20]. Reducing primary CS in Group II is vital, as it directly influences the size of Group V in future pregnancies. Strict adherence to evidence-based induction protocols and allowing adequate time for labor progression may help reduce unnecessary CSs in this group [21].

Groups I and III, representing low-risk nulliparous and multiparous women with spontaneous labor, showed low CS rates (8.51% and 1.49%, respectively), and contributed significantly to vaginal deliveries. These findings reflect appropriate obstetric practices and should be preserved. Maintaining low CS rates in these groups is critical, as they form the foundation of safe and physiological childbirth models.

Group IV (multiparous, induced or caesarean before labour) and Group X (singleton, cephalic, preterm) contributed 10.12% and 10.01% to total CSs, respectively. The 68.7% CS rate in Group IV suggests a potential over-reliance on elective cesarean in multiparous women. In Group X, a 43.63% CS rate may reflect clinical caution regarding preterm labor, although some of these could potentially be managed vaginally with close monitoring [22].

The major cause for the rising caesarean in groups 2 & 4 was fetal distress, which was the most common indication [23]. Non-reassuring fetal heart rate by Continuous electronic fetal heart rate monitoring was the main indication for caesarean [14]. In cases of lower-risk pregnancies, we can use the auscultation method rather than continuous fetal Doppler. Thus, prompt identification of fetal distress cases is very important during labor.

According to the WHO4 recommendation, the size of group 6 & 7, which is breech presentation, should be around 3-4%. Our study rates are within this range, < 3%.

Group 6-9 had high caesarean rates. These findings are consistent with study done by Pham HT *et al* [24]. Nonetheless,

careful case selection and availability of skilled personnel for vaginal breech deliveries or twin births could help reduce CS in some cases.

The leading indication for CS was previous cesarean (45.33%), followed by fetal distress (20.25%). These results are comparable to other Indian studies [25]. Fetal distress may often be over diagnosed, particularly in settings with limited access to continuous electronic fetal monitoring. We can use sophisticated intra-partum monitoring and opinions of other obstetricians to mitigate this trend.

In most of the Indian studies, group 5 was the major contributor to caesarean section. In other parts of the world, different groups can contribute more [11]. Thus, Robson's ten-group classification plays a major role in worldwide comparison and analysis of caesarean rates.

The reduction of primary caesarean section and thereby decreasing the total caesarean section rate is a critical need [18]. This requires more dedication from treating obstetricians. Use of the WHO checklist, the Partogram, and techniques like epidural analgesia to reduce labor pain can be done. Repeated conduction of CMEs, workshops regarding breech delivery conduction, and external cephalic version can be taught and discussed by an experienced obstetrician. The conduct of safe VBAC is the need of the hour [26]. The caesarean section demand by mothers can be reduced by discussing with them regarding partogram, epidural analgesia for pain relief.

This study demonstrates the utility of Robson ten ten-group classification as an important tool for identifying high-contributing groups and guiding quality improvement in obstetric practice. Regular audits and targeted interventions, especially in Groups V and II, can significantly reduce unnecessary caesarean deliveries.

Conclusion

In our study, Group 5 emerged as the major contributor to overall caesarean section rate. Trial of labour VBAC can be encouraged to decrease the caesarean rate in this group. Group II emerged as second second-largest contributor. Strict adherence to evidence-based induction protocols and allowing adequate time for labor progression may help reduce unnecessary Caesareans in this group. Groups I and III contributed significantly to vaginal deliveries. These findings reflect appropriate obstetric practices and should be preserved. The main indication for the increased caesarean rate in groups II and IV was fetal distress. Improved intrapartum monitoring and the use of the auscultation method instead of electronic fetal heart rate assessment can reduce the caesarean rate. The proper training of all staff, strict following of recommended protocols, and discussion among fellow obstetricians while making decisions play a pivotal role in avoiding unnecessary caesarean section rates.

Limitations of the study

- The individual maternofetal outcome was not traced in the study.
- Since it is a retrospective study, the recording of some important information may be missed.

Strengths of the study

- Since Robson TGCS is a universally accepted and standardized method to classify all deliveries into 10 clear, mutually exclusive and totally inclusive groups, it helps to pinpoint which group contribute most to the overall CS rate, guiding policy makers and health care workers to reduce the

CS rate.

- Objective criteria make it less prone to observer bias in classification.

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