

CESAREAN AUDIT: USING ROBSON'S 10 GROUP CLASSIFICATION AT C. U. SHAH MEDICAL COLLEGE AND HOSPITAL

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ABSTRACT

Objective: The World Health Organization (WHO) has expressed concern over the rising cesarean section (CS) rate, particularly in middle- and high-income countries. The reasons behind this increase are still debated, but the WHO declared that there is no justification for a rate higher than 10–15%. The Robson classification system, advocated by WHO and FIGO, can help assess and compare CS rates.

Study Design and Methods: The Gynecology Department at C.U. Shah Medical College and Hospital conducted an observational study on pregnant patients hospitalized for labor pain between January 2020 and December 2022, with a focus on CS patients. The study used Robson's 10-group categorization technique to extract maternal features and categorize cesarean performances.

Results: Between January 2020 and December 2022, C. U. Shah Medical College and Hospital delivered 4967 patients, of whom 1,572 underwent a CS section. 46.3% were nulliparous, and 53.7% were multipara. 78.31% of patients arrived at full term, with 98.8% having single conceptions. 94.8% of the cases had a cephalic presentation, 4.4% had a breech presentation, and 0.81% had a transverse position.

Conclusions: Robson classification is a useful technique for analyzing cesarean delivery (CS) rates, aiding in identifying corrective methods to reduce burden on healthcare systems, and promoting accurate labor monitoring, fetal scalp electrodes, and prenatal education.

Keywords: Cesarean delivery, Robson classification, CS rate, Trial of labor.

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INTRODUCTION

When it is considered that a vaginal delivery could be harmful to the woman or the unborn child, a cesarean section (CS) is a potentially life-saving obstetric treatment that is frequently carried out [1,2]. Fundamentally different perspectives on CSs exist among patients and obstetricians as a result of advancements in science, as well as social, cultural, and legal developments. There is widespread concern about the rising CS rate, which is especially pronounced in many middle- and high-income countries but less so in low-income countries. The mechanisms driving the rise in CS rates are still being debated.

Some authors have suggested that fear of litigation, changes in maternal features, usage of electronic fetal monitoring, and a shift in professional practice style may all have a role [3-5]. Although CS is a safe procedure when performed by qualified medical personnel, the global rise in rates is cause for concern. This is because CS may be related to various maternal and newborn complications that affect the risk of future pregnancies.

In 1985, the World Health Organization (WHO) declared, "There is no justification for any region to have a CS rate higher than 10–15% [6]." One of the difficulties contributing to a better understanding of this trend and its underlying reasons is the lack of a standardized, internationally approved classification system for monitoring and comparing CS rates in a consistent, action-oriented manner [7].

To develop and implement effective solutions to reduce or increase the CS rate as needed, it is first required to determine which categories of women are having CSs and research the underlying causes of trends in various settings [8]. The WHO in 2015 and the International Federation

of Gynecology and Obstetrics in 2016 advocated using the Robson classification as a global standard for assessing, monitoring, and comparing CS rates within healthcare facilities, over time, and between facilities. This approach categorizes all women into one of ten mutually exclusive groups that, when combined, are entirely comprehensive. The categories are based on five basic obstetrical features (parity, number of fetuses, previous CS, commencement of labor, GA, and fetal Presentation) [9-11]. The current study aimed to audit CS using Robson's 10-group classification system (TGCS). The study's primary goal was to use TGCS to examine the prevalence rate of CS in our scenario and determine the major contributions of each subgroup to the overall CSR. Secondary objectives included comparing our CS rate to national and standard data, as well as maternal outcomes.

Robson's classification

Group	Group description
I	Nulliparous, singleton, cephalic > 37 weeks spontaneous labour
II	Nulliparous, singleton, cephalic ≥ 37 weeks, induced/prelabor CS
III	Multiparous single cephalic (excluding previous CS), ≥ 37 weeks in spontaneous labor
IV	Multiparous single cephalic (excluding previous cs), ≥ 37 weeks induced/prelabor CS
V	Previous CS, single cephalic ≥ 37 weeks
VI	Nulliparous with single breech

Group	Group description
VII	Multiparous with single breech (including previous CS)
VIII	Multiple pregnancy (including previous CS)
IX	Single pregnancy, transverse/oblique lie (including previous cs)
X	Singleton, cephalic<37 week (including previous cs)

Objectives

1. To analyze the prevalence rate of Caesarean section using Robson 10 group classification at our center.
2. To identify the main contributor of each subgroup to overall scoring rate.

METHODS

This is an observational study undertaken at C.U. Shah Medical College and Hospital’s Obstetrics and Gynecology Department. All pregnant patients hospitalized with labor pain to medical colleges and hospitals between January 2020 and December 2022, with our target group consisting solely of patients who underwent a CS.

The case files of all the women included in the study were retrieved and relevant information extracted, including maternal characteristics such as age, parity, gestational age, number of fetuses, fetal presentation, indication of cesarean, induction of labor, and types of CS (elective or emergency). The cesarean performances over the study period were classified using Robson’s 10-group classification scheme.

RESULTS

Between January 1st and December 31st, 2020, C. U. Shah Medical College and Hospital delivered 4967 patients. All women were included in the study. Of these, 1,572 underwent a CS section. 2,298 (46.3%) patients were nulliparous, and 2669 (53.7%) patients were multipara. 3887 (78.31%) arrived on term, while 1080 (21.7%) delivered before 37 weeks. 4907 (98.8%) had singleton conceptions, with only 60 (12%) having multiple pregnancies. 4709 (94.8%) had a cephalic presentation, 220 (4.4%) had a breech presentation, and 38 (0.81%) had a transverse lie (Table 1). 1130 patients (22.8%) were induced, while 2796 (56.2%) had spontaneous labor pain.

Table 2 shows the group size, number of cesareans, group cesarean rate, and total absolute relative contribution rate. Out of 4967 patients, 1572 women underwent CSs, for an overall rate of 30.4%. The majority of patients (24.3%) belonged to Group 1, followed by Group 3 (27.5%). Groups 7 and 9 had 100% CS rates, followed by Group 5 at 76.9%. Group 5 made the highest contribution to CS [33.1% relative contribution and 10.1% absolute contribution], followed by Group 1 (8.97% relative and 29.1% absolute contribution). Groups 7, 9, and 10 each provided less than 3% (relatively), with group 10 contributing the least (0.67 absolute and 2.1% relative contribution).

Fig. 1 depicts the various indications of a CS. The most common indication for CS was previous CS (33.7%), followed by fetal distress (11.9%). Only 2.5% of patients had an abnormal lie.

Fig. 2 shows the maternal complication. Around 34 patients (2.2%) required COMOC-MG sutures for treatment of PPH while around 20 patients (1.3%) underwent hysterectomy. 32 patients (2.1%) required ICU admission and Only 0.7% (10 patients) had bladder injury.

Table 3 shows the indications for CS based on different groups. In Group 1, the majority of CSs were performed due to fetal distress (18.6%), followed by meconium-stained liquor (17.7%). The same was true for group 2, when 14.6% of patients had a Cesarean for fetal distress, followed by 15.27% for meconium-stained liquor. In groups 3

Table 1: Obstetrical variables used in Robson’s classification

[A]	Parity		
	Nullipara	2298	(46.3%)
[B]	Multipara	2669	(53.71%)
	Previous CS		
[C]	Yes	1267	(25.5%)
	No	3709	(74.5%)
[D]	Gestational age		
	<37 weeks	1080	(21.7%)
[E]	>37 weeks	3887	(78.3%)
	Onset of labor		
[F]	Prelabor	1041	(21%)
	Induced	1130	(22.8%)
[G]	Spontaneous	2796	(56.2%)
	Presentation		
[H]	Cephalic	4709	(94.8%)
	Breech	220	(4.4%)
[I]	Transverse	38	(0.8%)
	Number of Fetuses		
[J]	Single	4907	(98.8%)
	Multiple	60	(1.2%)

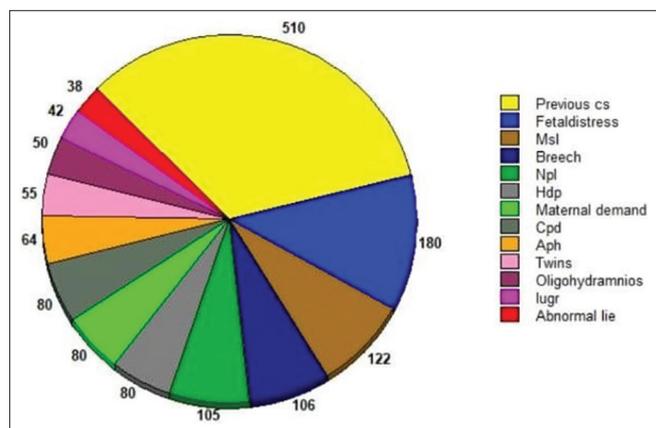


Fig. 1: Indication of cesarean section. CS: Caesarean section, MSL: Meconium stained liquor, NPL: Non-progressive labor, HDP: Hypertensive disorder in pregnancy, CPD: Cephalopelvic disproportion, APH: Antepartum haemorrhage, IUGR: Intrauterine growth retardation

and 4, the most common indication was fetal distress (46.2% and 45.5%, respectively).

In groups 5, 99% of patients had a previous CS, with only 1% having a cesarean for antepartum hemorrhage (which included both placenta previa and abruption placentae). In groups 6 and 7, breech was an absolute indication (100%). In group 8, twin was the absolute indication (100%), while in group 9, transverse (abnormal lie) was the absolute indication. In group 10, previous CS was the most common indication, including 46.9% of patients, followed by oligohydramnios (15.6%).

Table 4 depicts group-wise complication. Group 6 had no complications, whereas Group 5 had the maximum complications, comprising around 29 patients. In this case, 8 patients underwent obstetric hysterectomy, 9 required COMOC-MG sutures, 7 were admitted to the ICU, and 5 suffered bladder injury. Group 4 and Group 8 each included 13 patients. Aside from ICU hospitalization, which was greatest in group 1 with 8 patients, group 5 had the highest number of complications.

DISCUSSION

In this study, the overall cesarean rate was 30.4% for the past 3 years. It is higher than the overall Gujarat CS rate which is 21% as NFHS-5 (2019-2020).

Table 2: Robson classification report table

Group	Group description	Total number of women in group	Size of group	Number of cesarean	Group CS rate	(Absolute) contribution to overall CS	(Relative) contribution to overall CS rate
I	Nulliparous, singleton, cephalic > 37 Weeks (spontaneous)	1456	29.3	440	30.2	8.9	29.1
II	Nulliparous, singleton, cephalic > 37 weeks, induced/prelabor	902	18.1	230	25.5	4.6	15.2
III	Multiparous single cephalic (excluding previous CS), ≥ 37 weeks	1368	27.5	56	4.1	1.0	3.7
IV	Multiparous single cephalic (excluding previous CS), ≥ 37 weeks induced	260	5.2	55	21.2	1.1	3.6
V	Previous CS, single cephalic > 37 week	650	13.1	500	76.9	10.1	33.1
VI	Nulliparous with single breech	80	1.6	68	85	1.4	4.5
VII	Multiparous with single breech (including previous CS)	38	0.8	38	100	0.8	2.5
VIII	Multiple pregnancy (including)	85	1.7	55	64.7	1.1	3.6
IX	Single pregnancy, transverse/oblique lie (including previous CS)	88	0.8	38	100	0.8	2.5
X	Singleton, cephalic < 37 week (including previous CS)	90	1.8	32	35.6	0.6	2.1

Table 3: Indication of cesarean section within each Robson group

Indications	1	2	3	4	5	6	7	8	9	10
Previous CS	0	0	0	0	495 (99)	0	0	0	0	15 (46.9)
Fetal distress	82 (18.6)	45 (19.6)	26 (46.2)	25 (45.5)	0	0	0	0	0	2 (6.2)
MSL	78 (17.7)	35 (15.2)	4	4	0	0	0	0	0	1 (3.1)
Breech	0	0	0	0	0	68 (100)	38 (100)	0	0	0
NPL	68 (15.5)	32 (13.9)	2	3	0	0	0	0	0	0
HDP	45 (10.2)	15 (6.5)	10	6	0	0	0	0	0	4 (12.5)
MD	38 (8.6)	27 (11.7)	7	8	0	0	0	0	0	0
CPD	61 (13.4)	16 (7)	3	0	0	0	0	0	0	0
APH	32 (7.3)	20 (8.7)	2	4	5	0	0	0	0	1
Twins	0	0	0	0	0	0	0	55 (100)	0	0
Oligohydramnios	24 (5.5)	18 (7.8)	1	2	0	0	0	0	0	5 (15.6)
IUGR	12 (2.7)	22 (9.6)	1	3	0	0	0	0	0	4 (2.5)
Abnormal lie	0	0	0	0	0	0	0	0	38 (100)	0

CS: Cesarean section, MSL: Meconium stained liquor, NPL: Non-progressive labor, HDP: Hypertensive Disorder in Pregnancy, CPD: Cephalopelvic disproportion, APH: Antepartum hemorrhage, IUGR: Intrauterine growth retardation

Table 4: Maternal outcome according to Robson classification

Group no	Total patients	Obstetric hysterectomy	Comoc Mg suture	Bladder injury	ICU admission
1	10	0	2	0	8
2	9	0	3	0	6
3	9	1	4	0	4
4	13	3	5	0	5
5	29	8	9	5	7
6	0	0	0	0	0
7	6	2	4	0	0
8	13	4	5	2	2
9	4	2	2	0	0
10	3	0	0	3	0
Total	96	20	34	10	32

Table 5: Year-wise distribution of deliveries

Year	Total deliveries	Total CS	Total ND	CS rate (%)
2020	1963	556	1407	28.3
2021	1453	432	1021	29.7
2022	1552	524	1027	33.8
Total	4967	1512	3455	30.4

In comparison, a study undertaken by Dr. Preeti Punatar *et al.* showed a decreasing tendency in CS of 33.28%, 33.65%, and 28.47% for the years 2020, 2021, and 2022, respectively.

Similarly to our study, Pratima Mittal *et al.* showed a rising trend in the CS rate of 22.4%. The survey found a CS rate of 22.4%, 23.5%, and 25.51% over the past 3 years.

Overall, the cesarean rate in India has risen from 10.6 (NFHS-3, 2005–2006) to 17.21 (NFHS-4, 2015–16). CS rates currently stand at 21.5% (2019–20) [17]. Similarly, the rate of CSs has grown in Gujarat from 18.4% (NFHS-4 (2015-16)) to 21% (NFHS-5 [2019-20]).

It was also observed that the CS rate has been increasing over the last three years, with a rate of 26.3% in 2020, 29.7% in 2021, and 33.8% in the year, indicating the need to focus more on groups 5, 2, and 1.

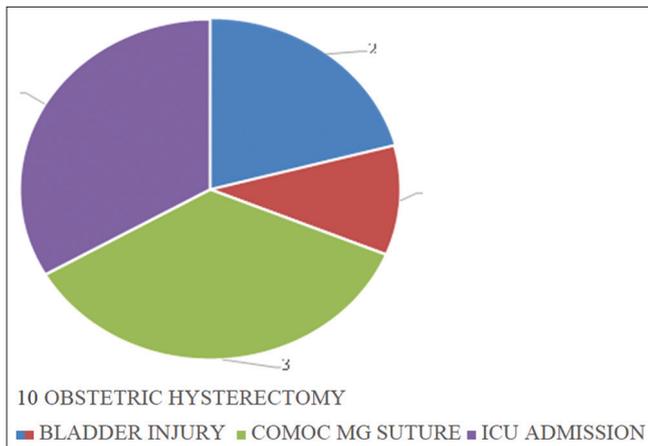


Fig. 2: Maternal outcome of cesarean

The major contributors to CS were similar to the studies conducted by Deshmukh *et al.* [15] in Maharashtra and Dr. Preeti Punatar *et al.* in Jamnagar, where groups 5, 1, and 2 were the highest.

Robinson 5 contributed the most to the overall CS rate, 33.1%. The indication for this group, CS, was 99%. Previous CS had only 1% for antepartum hemorrhage. In the study conducted by Preeti Punatar *et al.*, group 5 contributed 26.34 percent, which is the second highest contributor. Arpita de *et al.* showed 32.52%, while Dhodapkar's *et al.* study revealed a CS rate of 40.1% [16].

The size of group 5 shows that there has been a high CS rate in recent years, particularly in groups 1 and 2. Although the study did not ask how many women planned or tried vaginal birth after CS (VBAC), group 5 alone led to almost one-third of low vaginal births following CS. The high group-specific rate (76.9%) indicates a relatively low VBAC. It should be emphasized that various studies have shown that VBAC is safe in certain patients. Thus, knowing and understanding the indications and contraindications of the trial of labor after CS is key to success in reducing the rate of CS in Group 5.

Robson I. In this analysis, it was the second most significant contributor to the overall CS rate (29.1%). Preeti Punatar *et al.* reported 34.09% CS rating in Group 1, making it the top contributor. In the Dhodapkar *et al.* study, the total contribution of group 1 was 24%, while in Arpita de *et al.*, it was 22.86%. The group-specific CS rate was 30.2%, including fetal distress.

The indications for this group of CS include fetal distress (18.6%), meconium-stained liquor (17.7%), non-progress of labor (15.5%), CPD (13.9%), maternal demand (8.6%), antepartum hemorrhage (7.31%), oligohydramnios (5.51%), IUGR (2.7%), and hypertensive disorder (10.2%). Fetal distress is the largest contributor, implying that a correct identification of fetal distress is necessary.

The routine use of CTG by low-risk women upon admission to the labor ward may be associated with an increase in its rate. In the event of a suspected CTG, Fetal scalp stimulation or fetal scalp blood can be utilized to rule out acidosis with fetal compromise (NICE recommendations), avoiding 90% of surgical operative intervention. Injections of oxytocin should also be avoided. Residents and staff must be trained repeatedly in order to make an accurate diagnosis of fetal distress and make informed decisions.

Robinson 2 was the third-highest contributor, with a 15.2% overall CS rate and a 25.2% group-specific CS rate. The indications were the same as in Group 1, with fetal distress being the most common (19.6%), followed by meconium-stained liquor (15.27%). Non-progression of labor (13.9%) Maternal demand (11.7%).

Rising IVF operations and other assisted techniques have resulted in an increase in maternal demand, as these are regarded as precious pregnancies. Furthermore, assisted reproductive techniques are associated with multiple pregnancies, which are considered elective CS sections.

In Group 8, Twin was the absolute indication. To reduce CS rates in this group. Training healthcare providers in the art of delivering twin pregnancies should be implemented.

Similarly, in Group 6, to reduce CS rates due to breech delivery, health professionals should be well trained in the external cephalic version along with the art of delivering breech.

A trial of normal labor in breech should be given to selected low-risk pregnancies (baby weight up to 2.5 kg).

Similarly, this practice can reduce the CS rate in Group 7 as well.

Strength and limitation

This study has a few limitations that should be considered. Some of the indications for CS should not be confirmed because the data was acquired retrospectively from case files. This lack of clear indication of CS may have led to a lack of uniformity and improper comparison. The main disadvantage of Robson's classification is that it does not account for newborn morbidity or any maternal high-risk variables. Also, given that the study was conducted in a single tertiary health center with a high number of referred cases, some of the findings may not be generalizable. This demonstrates the need for additional research on this topic.

CONCLUSION

An increase in the rate of cesarean delivery places a burden on the healthcare system. It is related to an increase in risk for both mother and child health. In our study and others, Groups 5, 2, and 1 were the most significant contributors. The Robson Classification is considered to be a good technique for analyzing CS rates. This, in turn, helps us identify corrective methods to lower CS rates.

Recommendations to lower CS rates based on our findings.

1. The art of accurate labor monitoring with partographs.
2. Fetal scalp electrodes and careful usage of oxytocics should be used.
3. Instrumental vaginal deliveries are to be emphasized.
4. All personnel are trained in protocols and have made a collaborative decision on how to do CS.
5. Trial of labor after Caesarean in selected cases.
6. Prenatal education of patients during her ANC visits to address her stress and queries regarding normal labor and CS should be provided

REFERENCES

1. Tura AK, Pijpers O, De Man M, Cleveringa M, Koopmans I, Gure T, *et al.* Analysis of caesarean sections using Robson 10-group classification system in a university hospital in eastern Ethiopia: A cross sectional study. *BMJ Open*. 2018;8:e020520. doi: 10.1136/bmjopen-2017-020520
2. Adewuyi EO, Auta A, Khanal V, Tapshak SJ, Zhao Y. Cesarean delivery in Nigeria: Prevalence and associated factors-a population-based cross-sectional study. *BMJ Open*. 2019;9:e027273. doi: 10.1136/bmjopen-2018-027273
3. Akadri AA, Odelola OI. A six year review of caesarean sections at Olabisi Onabanjo University teaching hospital Sagamu, South West Nigeria. *Niger Med Practitioner*. 2017;71(3-4):53-7
4. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in cesarean section rates: Global, Regional and National estimates: 1990-2014. *PLoS One*. 2016;11(2):e0148343. doi: 10.1371/journal.pone.0148343
5. Zwecker P, Azoulay L, Abenhaim HA. Effect of fear of litigation on obstetric care: A nationwide analysis on obstetric practice. *Am J Perinatol*. 2011;28(4):277-84. doi: 10.1055/s-0030-1271213
6. WHO. Appropriate technology for birth. *Lancet*. 1985;2:436-7.
7. Robson MS. Classification of caesarean sections. *Fetal Matern Med*

- Rev. 2001;12:23-39.
8. Torloni MR, Betran AP, Souza JP, Widmer M, Allen T, Metin G, *et al.* Classifications for caesarean section: a systematic review. *PLoS One.* 2011;6(1):e14566.
 9. Betrán AP, Torloni MR, Zhang J, Gülmezoglu AM, WHO Working Group on Caesarean Section. WHO statement on caesarean section rates. *BJOG.* 2016;123(5):667-70. doi: 10.1111/1471-0528.13526
 10. FIGO Working Group on Challenges in. Care of Mothers and Infants During Labour and Delivery. Best practice advice on the 10-group classification system for caesarean deliveries. *Int J Gynaecol Obstet.* 2016;135:232-3.
 11. WHO Recommendations Non-Clinical Interventions to Reduce Unnecessary Caesarean Sections. Geneva: World Health Organization; 2018. Available from: <https://www.who.int/publications/i/item/9789241550338>
 12. Patil SB, Rajitha D. Robson classification: Beyond caesarean rates. *Int J Reprod Contraception Obstetrics and Gynecology.* 2023 Jul;12(7):2241-6.
 13. Punatar P, Pattani B. Analysis of caesarean section rates based on ROBSON classification system in a tertiary care hospital in West Coast of Gujarat, India. *Int J Innov Res Med Sci.* 2023;8(4):160-4.
 14. Chavda D, Goswami K, Dudhrejia K. A cross sectional study of 1000 lower segment caesarean section in obstetrics and gynecology department of P. D. U Medical College, Rajkot, Gujarat, India. *Int J Reprod Contracept Obstet Gynecol.* 2017 Apr;6(4):1186-1191.
 15. Deshmukh P, Panchbudhe SA, Nimbkar AR. A study and analysis of caesarean sections by Robson's ten group classification system. *J S Asian Feder Obs Gynae.* 2022;14(4):370-3.
 16. Dhodapkar SB, Bhairavi S, Daniel M, Chauhan NS, Chauhan RC. Analysis of caesarean sections according to Robson's ten group classification system at a tertiary care teaching hospital in South India. *Int J Reprod Contracept Obstet Gynecol.* 2015;4(3):745-9.
 17. Mittal P, Pandey D, Suri J, Bharti R. Trend prediction for caesarean delivery based on Robson classification system at tertiary referral unit of North India. *J Obstet Gynecol India.* 2020 Apr;70(2):111-8.
 18. National Institute for Health and Clinical Excellence. Intrapartum care for healthy women and babies: Clinical Guideline; 2014. Available from: [Last accessed on 2020 Apr 07].
 19. Cunningham FG, Bangdiwala SI, Brown SS, Dean TM, Frederiksen M, Rowland Hogue CJ, *et al.* NIH consensus development conference draft statement on vaginal birth after caesarean: New insights. *NIH Consens State Sci Statements.* 2010;27:1-42.
 20. Robson Classification: Implementation Manual. Geneva: World Health Organization; 2017. Available from: <https://www.who.int/publications/i/item/978197> [Last accessed on 2023 Jan 21].