How to Cite:
Sonawane, N. P., Bharrati, V., Patil, A. S., & Deshmukh, P. (2022). Use of the robson classification to assess caesarean section at tertiary care teaching hospital. *International Journal of Health Sciences*, *6*(S7), 2939–2947. https://doi.org/10.53730/ijhs.v6nS7.12303

Use of the robson classification to assess caesarean section at tertiary care teaching hospital

Dr. Nikhil Pandurang Sonawane
Assistant Professor, Department of Obstetrics and Gynaecology, Dr Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik

Dr. Vinoad Bharrati
Head of the Department, Department of Obstetrics and Gynaecology, Rising Medicare Hospital kharadi Pune

Dr. Amit Shaligram Patil
Director, Department of Obstetrics and Gynaecology, IVF Nest, Wakad, Pune

Dr. Parag Deshmukh
Assistant Professor, Department of Obstetrics and Gynaecology, Dr Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik
Corresponding Author

***Abstract*---**Introduction: Rates of caesarean section surgery are rising worldwide, but the determinants of this increase, especially in low-income and middle-income countries, are controversial. In this study, we aimed to analyze the contribution of specific obstetric populations to changes in caesarean section rates, by using the Robson classification in two WHO multi country surveys of deliveries in health-care facilities. The Robson system classifies all deliveries into one of ten groups on the basis of five parameters: obstetric history, onset of labor, fetal lie, number of neonates, and gestational age. Material and Method: This is a prospective and cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at Tertiary care Teaching Hospital over a period of 1 year. The study population included all women who under-went CS in the hospital. Laparotomy for uterine rupture and files with missing information were excluded. Main outcome Robson groups (1–10—based on gestational age, fetal presentation, number of fetus, onset of labor and history of CS) and indications for CS. Results: Overall, mean age was 24.35±4.3 years. Majority of the women, 109 (72.7%) belonged to urban areas of residence, 62 (41.3%) gestational aged between 37-42 years while 100 (66.7%) had history of cesarean section. Most of the patients, 81 (54.0%) turned out to be from TGCS Group-10. Group-5

Manuscript submitted: 9 April 2022, Manuscript revised: 18 June 2022, Accepted for publication: 27 July 2022

and Group-1 were the 2nd and 3rd most common group, accounted for 21 (14.0%) and 16 (10.7%) cases respectively. Previous cesarean section (20.0%) and fetal distress (19.3%) were found to be most common indications leading to cesarean section. Conclusion: The use of the Robson classification is increasing rapidly and spontaneously worldwide. Despite some limitations, this classification is easy to implement and interpret. Several suggested modifications could be useful to help facilities and countries as they work towards its implementation.

Keywords: Robson's Ten-Group Classification, Cesarean section, Fetal distress.

Introduction

The crude rate of caesarean section surgery is an important global indicator for measuring access to obstetric services.[1] In many countries (especially high-income countries), rates of caesarean section have increased steadily during the past three decades.[2] The 1985 WHO statement that regional caesarean section rates should not exceed 10–15% [3] was based on evidence available at that time; however, the validity of this threshold has since been questioned. Conversely, in many lower-income countries, inadequate access to safe and timely caesarean section is a substantial barrier to improving the outcomes of mothers and neonates.[4] These nations are often hampered by an absence of reliable epidemiological data about births and mode of delivery.[5]

The determinants of rising caesarean section trends worldwide are controversial. Some authors have argued trends that the increase is driven largely by the rising use of non-medically indicated caesarean section,[6] which can pose unnecessary risks to mothers and neonates.[7] A deeper understanding of these drivers across countries has been complicated by an absence of international consensus regarding a universal caesarean section classification system. A 2011 systematic review by Torloni and colleagues of 27 caesarean section classification systems identified the ten-group classification system proposed by Robson in 2001 as the most appropriate to compare surgery rates. [8]

Robson's system classifies all deliveries into one of ten groups on the basis of five parameters: obstetric history (parity and previous caesarean section), onset of labor (spontaneous, induced, or caesarean section before onset of labor), fetal presentation or lie (cephalic, breech, or transverse), number of neonates, and gestational age (preterm or term; panel 1). The ten Robson categories are mutually exclusive, totally inclusive, and can be applied prospectively, since each woman admitted for delivery can be classified immediately on the basis of a few variables that are generally routinely recorded. This system helps institution-specific monitoring and auditing, and offers a standardized comparison method between institutions, countries, and timepoints. The Robson classification has been used to analyze trends and determinants of caesarean section use in health-care facilities in both high-income and low-income countries, [9] and has also been applied to state, national, and international datasets, including data from eight

Latin American countries in the WHO Global Survey of Maternal and Perinatal Health.[10]

To explore global caesarean section patterns and possible drivers of these, we analyzed changes in the characteristics of the obstetric populations in center and used the Robson classification to assess trends in group-specific caesarean section rates and the changes in the absolute and relative contribution of Robson groups to overall caesarean section rates over time.

Material and Methods

This is a prospective and cross-sectional study was conducted in the Department of Obstetrics and Gynaecology at Tertiary care Teaching Hospital over a period of 1 year. The study population included all women who under-went CS in the hospital. Laparotomy for uterine rupture and files with missing information were excluded.

The identity of women who underwent CS was obtained from the delivery logbook, admission and discharge register and operation logbook. The admission and discharge register and delivery logbook contain information about all women who delivered in the hospital regardless of mode of delivery (vaginal, CS) while the operation logbook contains only information about women who under-went CS. Using the medical registration number of each woman, we accessed all CS files performed during the study period.

For each CS case, we collected data on maternal characteristics (age, history of CS, parity and gravidity), pregnancy-related information (gestational age, fetal presentation, number of fetus and onset of labor) and maternal and fetal outcomes at discharge (complications, fifth minute APGAR score, birth weight, fetal and maternal status). Maternal complications included presence of a potentially life-threatening conditions (severe postpartum hemorrhage, severe pre-eclampsia, eclampsia, ruptured uterus, sepsis or severe systemic infections); admission to the intensive care unit other than for routine postoperative recovery; or receiving blood products.

Presence of any life-threatening complication (including maternal near miss or deaths) was assessed at discharge. Maternal near miss refers to a woman who nearly died (developed organ dysfunction) but survived the complication, based on the WHO definition. The dependent variable was the Robson classification group. Fetal presentations were classified as cephalic, breech or transverse/oblique. Gestational age was categorized as a term (≥37 weeks) or preterm (<37 weeks). Gestational age is assessed using early prenatal ultrasound or last menstrual period. In case of no early ultrasound and unknown last menstrual period, a combination of physical examination, third trimester ultrasound and estimated fetal weight is used for estimation of gestational age. For cases with undocumented gestational age, we used a birth weight of ≥2500 gm as a proxy to term pregnancy. The course of pregnancy was categorized as spontaneous and induced/CS before labor. Number of parities was classified as nulliparous or multiparous. The number of fetuses was categorized as singleton or multiple pregnancies.

Statistical analysis

All completed data were entered using using SPSS V.25. Descriptive statistics of study participants and variables was conducted. The Robson group was assigned based on four obstetric concepts (with their parameters)—category of the pregnancy, previous obstetric history, course of labor and gestational age. Results were presented as frequencies, percentages, means and SD.

Result

During the study interval, a total of 150 deliveries occurred. Overall, mean age was 24.35±4.3 years while most of the women, 135 (90.0%) were between 20 to 35 years of age. Majority of the women, 103 (68.6%) were multigravida, 62 (41.3%) gestational aged between 37-42 years, 100 (66.7%) history of cesarean section and 141 (94.0%) had cephalic fetal presentation (Table-I).

Table-I: Characteristics of Study Participants.

Characteristics		***Number (%)***	
Age (years)	<20	8	(5.0%)
	20-35	135	(90.0%)
	>30	7	(5.0%)
Gravidity	Primigravida	47	(31.4%)
	Multigravida	103	(68.6%)
Parity	Nulliparous	44	(29.3%)
	Multiparous	106	(70.7%)
Gestational Age (weeks)	<37	88	(58.7%)
	37-42	62	(41.3%)
	>42		0
History of Previous Cesarean Section	None	100	(66.7%)
	1	22	(14.7%)
	>1	28	(18.6%)
Onset of Labor	Spontaneous	75	(50.0%)
	Induction of Labor	3	(2.0%)
	Pre-labor	72	(48.0%)
	Cesarean Section		
Fetal Presentation	Cephalic	141	(94.0%)
	Breech	9	(6.0%)
Apgar Score (At 5 minutes)	≤7	15	(10.0%)
	>7	135	(90.0%)
Birth Weight (grams)	<2500	26	(17.3%)
	2500-4000	120	(80.0%)
	>4000	4	(2.7%)

Distribution of all deliveries performed during the study period according to Robson's TGCS is shown in Table -II. Most of the patients, 81 (54.0%) turned out to be from Group-10. Group-5 and Group-1 were the 2nd and 3rd most common group, accounted for 21 (14.0%) and 16 (10.7%) cases respectively.

Table-II: Distribution of Cesarean Section in terms of Robson's TGCS.

Classification	*Description of Robson's 10-Groups Classification*	*No.*	*(%) Contribution made by each group to overall CS*
1	Nulliparous, single cephalic, ≥37 weeks, in spontaneous labor.	16	10.7
2	Nulliparous, single cephalic, ≥37 weeks, induced or caesarean section (CS) before labor.	10	6.7
3	Multiparous (excluding previous CS), single cephalic, ≥37 weeks, in spontaneous labor.	10	6.7
4	Multiparous (excluding previous CS), single cephalic, >37 weeks, induced or CS before labor.	3	2.0
5	Previous CS, single cephalic, ≥ 37 weeks.	21	14.0
6	All nulliparous breeches.	3	2.0
7	All multiparous breeches (including previous CS).	4	2.7
8	All multiple pregnancies (including previous CS).	1	0.6
9	All abnormal lies (including previous CS).	1	0.6
10	All single cephalic, <37 weeks (including previous CS)	81	54.0

Indications for cesarean section are listed in Table-III. Previous cesarean section (20.0%) and fetal distress (19.3%) were found to be most common indications.

Table-III: Indications leading to Cesarean Section in the Present Study (n=150).

Indications	***Number (%)***	
Previous Cesarean Section	30	(20.0%)
Fetal Distress	29	(19.3%)
Hypertensive Disorders of Pregnancy	9	(6.0%)
Failed Induction of Labor	7	(4.7%)
Cephalopelvic Disproportion	7	(4.7%)
Maternal Requests	6	(4.0%)
Contracted Pelvis	8	(5.3%)
Breech	8	(5.3%)
Abruption	9	(6.0%)
Placenta Previa	8	(5.3%)
Others	29	(19.4%)

Discussion

This study presenting the experiences of users on the pros and cons of the adoption, implementation and interpretation of the Robson classification for CS. Our findings show that, despite the lack of official endorsement by any international institutions or any formal guidelines, the use of the Robson classification is increasing rapidly and spontaneously worldwide. In this scenario,

the experience and views of the users are a rich source of knowledge and guidance.

According to the users, the main strengths of the Robson classification are the simplicity of its design, the validity of its purpose, its ease of implementation and directness of initial interpretation. This classification has the capacity to overcome the main drawbacks of those which are based on the indications for performing a CS with categories that are not mutually exclusive and with low reproducibility for some of the most common conditions that lead to CS, such as fetal distress or dystocia.

Our study showed that groups 3, 5, and 1 were the major contributors to the overall CS rate. This indicates high CS rate both in primary (groups 1 and 3) and secondary (group 5) CS. The study also showed that only one-third (36.6%) of the CS were performed for absolute maternal indications. A quarter of the women had a potentially life-threatening condition (including nine maternal deaths), resulting in admission for more than 7days in 29.2% of the women. Since a majority of births in India specially in Villages are occurring at home,10 most births in the hospital are among women with complications or women living in the urban areas nearby the hospital.

Our findings are in line with a classification applied in hospitals from Tanzania and South Africa where the three major groups (1, 3 and 5) were the same, though in a different order. [11,12] In South Africa, groups 1, 5 and 3 while in Tanzania groups 1, 3 and 5 were the leading contributors. This may be related to variations in population demographics and overall CS rates. [13] The contribution of group 3 could be justifiable in our study since the majority of the CS were performed for absolute maternal indications (obstructed labour and major antepartum haemorrhage). In a study from a university hospital in Cote d'Ivoire, however, the most common groups were groups 1, 2 and 3. [14]

The importance of group 2 (nulliparous single cephalic term pregnancy, induced or caesarean before labour) in the study from Cote d'Ivoire could be explained by variations in indications for inductions of vaginal birth or CS in the two settings. In most high-income settings, groups 5, 2 and 1 are the major contributors to overall CS rate unlike the studies from low-income settings. [15-19] The variations between high-income settings and our study may be related to fertility trends and, therefore, stronger presentation of groups 1 and 2 in high-income settings, compared with stronger presentation of multiparous women (group 3) in our low-resource setting with high fertility rates. [20] Induction of labour (group 2) is more frequently practised in high-income settings ranging from 8.3% in Latvia to 33% in Wallonia (Belgium) compared with 4.4% in Africa. [21]

Risk selection in antenatal care is better developed, which leads to more frequently indicating induction of labour. [22] Barriers for induction of labour in low-resource settings might be the unavailability of facilities to perform CS in case of failed induction. [23] The fact that group 5 women were one of the major contributors both in high-income and low-income settings indicates the importance of preventing primary caesarean if a meaningful reduction in overall

CS rate is to be achieved. In a study from Tanzania both primary and secondary CS were rising overtime. [24]

The flexibility of the classification allows for the creation of subdivisions in each group that can improve analyses of local clinical practices. These suggestions are a critical contribution of this study, providing clinicians, other health professionals and researchers with additional ideas to tailor the classification to their needs. Subdivisions have been proposed in almost all of the 10 Robson groups but it is clear that group 5 (women with a previous CS) is the group that received the largest number of suggestions. The recommended modifications in group 5 fall into one of two major axes: either the previous obstetric history of the woman (previous vaginal delivery or number of CS) or the onset of labor (spontaneous or other). [25]

In the current context of increasing numbers of caesarean deliveries, the contribution of the group of women with a previous CS (Group 5) to the overall rate of CS is critical from a clinical and epidemiological perspective to interpret practices and monitor the effectiveness of interventions. In addition, if users feel that more in depth analysis are needed, they can add the indications for CS, epidemiological information (e.g., BMI, age) and outcome (e.g., morbidity and mortality) within the 10 groups.

In the current international scenario of increasing rates of CS, the main drivers of this trend are still unclear and controversial. We believe that a CS rate can only be considered appropriate if the information is available to explain and justify it, and in this context, this study provides important information, guidance and suggestions on how to use the Robson classification such as adding subdivisions and defining a new group for women with missing variables. By collecting real and timely data about which specific groups of women are having a CS, this classification can contribute to a better understanding of the drivers of increasing CS rates and to the development of effective interventions to safely curb this trend.

Conclusion

The use of the Robson classification is increasing rapidly and spontaneously worldwide. Despite some limitations, this classification is easy to implement and interpret. Several suggested modifications could be useful to help facilities and countries as they work towards its implementation.

References

1. Khan MA, Sohail I, Habib M. Auditing the cesarean section rate by robson's ten group classification system at tertiary care hospital. Professional Med J. 2020;27(4):700-706.
2. Ye J, Betrán AP, Vela MG, Souza JP, Zhang J. Searching for the optimal rate of medically necessary cesarean delivery. *Birth* 2014; 237-44.
3. Ye J, Zhang J, Mikolajczyk R, Rorloni MR, Gulmezoglu Am, Betran AP. Association between rates of caesarean section and maternal and neonatal

mortality in the 21st century: a worldwide population-based ecological study with longitudinal data. BJOG 2016;123(5):745-753.
4. Boyle A, Reddy UM. Epidemiology of cesarean delivery: the scope of the problem. *Semin Perinatol* 2012; **36:** 308–14.
5. Tan JK, Tan EL, Kanagalingan D, Tan LK. Rational dissection of a high institutional cesarean section rate: an analysis using the Robson Ten Group Classification System. *J Obstet Gynaecol Res* 2014;
6. Abdel-Aleem H, Shaaban OM, Hassanin AI, Ibraheem AA. Analysis of cesarean delivery at Assiut University Hospital using the Ten Group Classification System. *Int J Gynaecol Obstet* 2013; 119–23.
7. Kelly S, Sprague A, Fell DB, et al. Examining caesarean section rates in Canada using the Robson classification system. *J Obstet Gynaecol Can* 2013; **35:** 206–14.
8. Souza JP, Gülmezoglu AM, Vogel J, et al. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study. *Lancet* 2013; **381:** 1747–55.
9. Torloni MR, Betrán AP, Souza JP, et al. Classifications for cesarean section: a systematic review. *PLoS One* 2011; **6:** e14566.
10. Fuglenes DD, Aas EE, Botten GG, Øian PP, Kristiansen ISI. Why do some pregnant women prefer cesarean? The influence of parity, delivery experiences, and fear. *Am J Obstet Gynecol* 2011; **205:** 45–49.
11. WHO. Trends in maternal mortality: 1990 to 2013. Geneva: World Health Organization, 2013.
12. Tsega F, Mengistie B, Dessie Y, *et al*. Prevalence of cesarean section in urban health facilities and associated factors in Eastern Ethiopia: hospital based cross sectional study. *J Preg Child Health* 2015; 2:169–73.
*13.*Gebremedhin S, Trend GS. Trend and socio-demographic differentials of Caesarean section rate in Addis Ababa, Ethiopia: analysis based on Ethiopia demographic and health surveys data. *Reprod Health* 2014; 11:14.
14. Abebe FE, Gebeyehu AW, Kidane AN, *et al*. Factors leading to cesarean section delivery at Felegehiwot referral hospital, Northwest Ethiopia: a retrospective record review. *Reprod Health* 2016; 13:6,015.
*15.*Makhanya V, Govender L, Moodley J. Utility of the Robson Ten Group Classification System to determine appropriateness of caesarean section at a rural regional hospital in KwaZulu-Natal, South Africa. *S Afr Med J* 2015; 105:292–5.
16. Betran AP, Ye J, Moller AB, Zhang J, Gulmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates: 1990-2014. PLoS One 2016; 11: e0148343.
17. Mumtaz S, Bahk J, Khang YH. Rising trends and inequalities in cesarean section rates in Pakistan: Evidence from Pakistan Demographic and Health Surveys, 1990-2013. PLoS One. 2017;12(10): e0186563.
18.Sumankuuro J, Crockett J, Wang S. Perceived barriers to maternal and newborn health services delivery: a qualitative study of health workers and community members in low and middle-income settings. BMJ Open. 2018;8(11):e021223.
19.Suryasa, I. W., Rodríguez-Gámez, M., & Koldoris, T. (2021). Health and treatment of diabetes mellitus. International Journal of Health Sciences, 5(1), i-v. https://doi.org/10.53730/ijhs.v5n1.2864

20. Rafiei M, Saei Ghare M, Akbari M, Kiani F, Sayehmiri F, Sayehmiri K, et al. Prevalence, causes, and complications of cesarean delivery in Iran: A systematic review and meta-analysis. Int J Reprod Biomed. 2018;16(4):221-234
21. Gilani S, Mazhar SB, Zafar M, Mazhar T. The modified Robson criteria for Caesarean Section audit at Mother and Child Health Center Pakistan Institute of Medical Sciences Islamabad. J Pak Med Assoc. 2020;70(2):299-303.
22. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, et al. (2000) Meta-analysis of observational studies in epidemiology. A proposal for reporting. JAMA 283: 2008–2012.
23. Delbaere I, Cammu H, Martens E, Tency I, Martens G, et al. (2012) Limiting the caesarean section rate in low-risk pregnancies is key to lowering the trend of increased abdominal deliveries: an observational study. BMC Pregnancy Childbirth 12: 3.
24. Goonewardene M, Kumara DMA, Arachchi DRJ, Vithanage R, Wijeweera R (2012) The rising trend in caesarean section rates: should we and can we reduce it? Sri Lanka Journal of Obstetrics and Gynaecology 34: 11–18.
25. Teguete I, Traore M, Sissoko A, Djire MY, Thera A, et al. (2012) Determining Factors of Cesarean Delivery Trends in Developing Countries: Lessons from Point G National Hospital (Bamako-Mali). In: Salim R, editor. Cesarean Delivery: InTech.
26. Slavin V, Fenwick J (2012) Use of a Classification Tool to Determine Groups of Women That Contribute to the Cesarean Section Rate: Establishing a Baseline for Clinical Decision Making and Quality Improvement. International Journal of Childbirth 2: 85–94.