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Original Article

Obstetrics and Gynaecology Section

Evaluation of Caesarean Section Rates Utilising Robson's Classification System: A Retrospective Observational Study from Eastern India

VAIBHAV SHIVAJI PATIL[1], SOHINI BHATTACHARYA[2], SELIM AKHTAR[3]

ABSTRACT

Introduction: The increasing trends in Caesarean Section (CS) globally are undoubtedly alarming. Although the World Health Organisation (WHO) did not specify an 'optimal' rate in 2015, it is essential to study caesarean deliveries to understand the causes of the rising rates and prevent unnecessary CS. Robson's classification system, recommended by the WHO, is the most appropriate tool for this purpose.

Aim: To identify groups of women according to Robson's Ten-group Classification System (TGCS) assess the complications and morbidities of both mothers and neonates, and analyse the indications for caesarean delivery.

Materials and Methods: A retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at Jalpaiguri District Hospital, Jalpaiguri, West Bengal, India, from April 2021 to March 2022. A total of 350 women who underwent CS were included in the study, The study population was divided into ten groups (1-10) according to Robson's TGCS. The variables assessed included the age group and gravidity status of the mothers, indications for CS, and maternal and neonatal mortality and morbidity. Data were collected from the operating theatre register, mother and baby bed head tickets, sick neonatal care unit admission registers, and Critical Care Unit (CCU)/High Dependency Unit (HDU) admission registers at one-month intervals. Frequencies and percentages were calculated.

Results: Most of the women (120 mothers) belonged to the age group of 20-24 years. Out of the total, 206 mothers (59%) were primigravida, while 144 (41%) were multigravida. A total of 73 mothers (20.9%) fell under Group 2 of Robson's classification system, followed by Group 1 50 (14,3%) and Group 4 49 (14%). The least number of women were in Group 7 11 (3.1%). Oligohydramnios was the indication for 45 mothers (12.8%). Total 10 mothers required HDU admission, and two required CCU admission postoperatively. There were no maternal deaths and no cases of peripartum hysterectomy. One birth was stillborn, and there were 13 neonatal deaths among 349 live neonates.

Conclusion: In present study, authors found that most of the mothers were primigravida and fell under Group 2 of Robson's classification system. The most common indication for CS was foetal distress, followed by a history of previous CS.

Keywords: Caesarean audit, Foetal distress, Maternal morbidity, Neonatal morbidity, Robson's ten group classification system

INTRODUCTION

The Caesarean Section (CS) is considered a life saving procedure for maternal and/or foetal indications when any obstetric condition precludes vaginal birth. Despite the increased risk of maternal morbidity due to various complications like postpartum haemorrhage, blood transfusion, hysterectomy, Intensive Care Unit (ICU) admission, sepsis, metabolic dysfunctions, and even maternal death, there has been a progressive increase in caesarean births worldwide over the past few decades, including in both developing and developed countries. Researchers have explained various medical and non medical reasons behind this rising rate [1].

Although the WHO recommended in 1985 that CS rates should not exceed 15% [2], in India, CS rates have nearly doubled in the public sector, rising from 8.5% in 2005 to 17.2% in 2016. In the private sector, this rate surged from 12.3% to 40.9% during the same period, indicating a huge gap between these two sectors [3]. In 2015, the WHO introduced a new policy that superseded the earlier one and did not specify any "optimal" rate. Instead, they recommended that "every effort should be made to provide CSs to women in need, rather than striving to achieve a specific rate" [4]. Therefore, it is essential to study the population undergoing CS to understand the extent of preventable caesarean deliveries.

Robson's Ten Group Classification System (TGCS), recommended by the WHO and the International Federation of Gynaecology and Obstetrics (FIGO) in 2015, is the most appropriate classification system used globally for monitoring, comparing, and understanding caesarean delivery rates [5].

Hence, objectives of the present study were to identify the groups of women according to Robson's ten-group classification that contribute the most and the least to overall CS rates at Jalpaiguri District Hospital, to identify the complications and morbidities of both mothers and neonates associated with each caesarean delivery and to analyse the groups regarding the indications for caesarean delivery so that changes in obstetric practices can be suggested.

MATERIALS AND METHODS

A retrospective observational study was conducted in the Department of Obstetrics and Gynaecology at Jalpaiguri District Hospital, Jalpaiguri, West Bengal, India, from April 2021 to March 2022. Approval was

obtained from the Ethical Committee of North Bengal Medical College, Siliguri, Darjeeling, West Bengal (IEC/NBMC/2020-21/68, Dated 31.03.2021).

Inclusion criteria: Authors included 350 women who delivered by CS at Jalpaiguri District Hospital, a secondary care level hospital, during the study period. Mothers who underwent CS on every Monday (24-hour duration) of the week were considered in the sample, adhering to the exclusion criteria.

Exclusion criteria: Mothers with a gestational age of <32 weeks and Neonates born with congenital anomalies.

Study Procedure

For monitoring CS, Robson's TGCS was endorsed by the WHO in 2015 [Table/Fig-1] [5]. This classification system is primarily based on the present pregnancy status (parity, number of foetuses, foetal presentation, and lie), past obstetric history, gestational age, and the course of labour. Data were collected from the mother's and baby's bed head tickets, the Special Newborn Care Unit (SNCU) admission register, and the CCU/HDU admission register at one-month intervals.

Group	Description
1	Nullipara, single, cephalic, term pregnancy, spontaneous labour
2	Nullipara, single, cephalic, term, induced labour or planned CS
3	Multipara without uterine scar, single, cephalic, term, spontaneous labour
4	Multipara without uterine scar, single, cephalic, term, induced labour or planned CS
5	Multipara with uterine scar, single, cephalic, term
6	Nullipara, single, breech presentation
7	Multipara, single, breech, including previous C-section
8	Multiple pregnancy
9	Single, abnormal lie, including previous scar
10	Single, cephalic, preterm including previous scar

[Table/Fig-1]: Robson's Ten group Classification System (TGCS) [5].

STATISTICAL ANALYSIS

The data were entered into a Microsoft Excel sheet, and frequency and percentage were calculated.

RESULTS

During the one-year study, a total of 350 women who underwent caesarean delivery were evaluated in the Obstetrics and Gynaecology Department of Jalpaiguri District Hospital, West Bengal.

Most of the women (120 mothers) in present study population belonged to the age group of 20-24 years (34.3%), followed by the age group of 25-29 years 101 (28.9%) mothers. Total 74 (21.1%) mothers were aged above 30 years, while the least number of women (55 mothers) were in the age group of less than 20 years (15.7%). Most of the women (293 out of 350) belonged to socioeconomic status class 4, while the least proportion (17 out of 350) belonged to class 5 of the Modified BG Prasad scale [6]. Only 154 (44%) mothers had their current pregnancies booked at a healthcare facility, whereas the majority were unbooked [Table/Fig-2]. Most women fell under Group 2, followed by Group 1 and Group 4, with the least number in Group 7 [Table/Fig-3].

The most common indication for CS was foetal distress in Group 1 (23 out of 50), while oligohydramnios was the most common indication in Group 2 (23 out of 73) [Table/Fig-4].

Gravida status and booking status	N (%)
Primi gravida	206 (58.9)
Multi gravida	144 (41.1)
Booked	154 (44)
Not booked	196 (56)

[Table/Fig-2]: Distribution of mothers according to gravid status and health care facility booking status.

Robson's ten-group classification	N (%)
Group 1 (Nullipara, single, cephalic, term pregnancy, spontaneous labour)	50 (14.3)
Group 2 (Nullipara, single, cephalic, term, induced labour or planned CS)	73 (20.9)
Group 3 (Multipara without uterine scar, single, cephalic, term, spontaneous labour)	45 (12.9)
Group 4 (Multipara without uterine scar, single, cephalic, term, induced labour or planned CS)	49 (14)
Group 5 (Multipara with uterine scar, single, cephalic, term)	43 (12.3)
Group 6 (Nullipara, single, breech presentation)	24 (6.9)
Group 7 (Multipara, single, breech, including previous C-section)	11 (3.1)
Group 8 (Multiple pregnancy)	12 (3.4)
Group 9 (Single, abnormal lie, including previous scar)	13 (3.7)
Group 10 (Single, cephalic, preterm including previous scar)	30 (8.6)

[Table/Fig-3]: Distribution of study population according to Robson's ten group classification.

Indication for CS under Robson's classification	N (%)
Group 1: Primigravida with:	**50 (14.3)**
Foetal distress/meconium-stained liquor	23 (9.2)
Eclampsia	1 (0.3)
Obstructed labour/failed instrumental delivery	7 (2)
Cephalo-pelvic disproportion	3 (0.9)
Prolonged dribbling per vagina	10 (2.9)
Cord prolapse	1 (0.3)
Malpresentation other than breech	2 (0.6)
Non progress of labour	3 (0.9)
Group 2: Primigravida with:	**73 (20.9)**
Oligohydramnios	23 (9.2)
Postdated pregnancy/induction failure	20 (5.7)
Hypertensive disorders in pregnancy (pregnancy induced hypertension/preeclampsia/eclampsia)	12 (3.4)
Antepartum haemorrhage	2 (0.6)
Placental insufficiency	4 (1.2)
Gestational diabetes mellitus	2 (0.6)
Abnormal doppler study/non-reassuring foetal status	10 (2.9)
Group 3: Multigravida with:	**45 (12.9)**
Foetal distress/meconium stained liquor	23 (9.2)
Eclampsia	0
Obstructed labour/failed instrumental delivery	4 (1.2)
Cephalo-pelvic disproportion	2 (0.6)
Prolonged dribbling per vagina	10 (2.9)
Hand/cord prolapse	2 (0.6)
Malpresentation other than breech	2 (0.6)
Non progress of labour	2 (0.6)

Group 4: Multigravida with:	**49 (14)**
Oligohydramnios	18 (5.1)
Postdated pregnancy/Induction failure	10 (2.9)
Hypertensive disorders in pregnancy (pregnancy induced hypertension/preelampsia/eclampsia)	10 (2.9)
Antepartum haemorrhage	4 (1.2)
Placental insufficiency	1 (0.3)
Gestational diabetes mellitus	2 (0.6)
Abnormal doppler study/non reassuring foetal status	4 (1.2)
Group 5: Post Lower Segment CS	**43 (12.3)**
Group 6: All Primigravida with breech	**24 (6.9)**
Group 7: Post LSCS with breech	**11 (3.1)**
Group 8: Multiple pregnancy	**12 (3.4)**
Twin pregnancy without previous CS	11 (3.1)
Twin pregnancy with previous CS	1 (0.3)
Group 9: Malposition other than breech	**13 (3.7)**
Transverse lie without previous CS	9 (2.6)
Oblique lie without previous CS	3 (0.9)
Transverse lie with previous CS	1 (0.3)
Oblique lie with previous CS	0
Group 10: Single cephalic preterm (<37 weeks) pregnancy with:	**30 (8.6)**
Oligohydramnios	4 (1.2)
Severe uncontrolled pregnancy induced hypertension/ eclampsia/preelampsia	9 (2.6)
Antepartum haemorrhage	3 (0.9)
Placental insufficiency/abnormal doppler study	1 (0.3)
Post LSCS in preterm labour with scar tenderness	10 (2.9)
Malpresentation other than breech	1 (0.3)
Prolong dribbling	2 (0.6)

[Table/Fig-4]: Distribution of study population according to indication for CS under robson's classification.

Blood transfusion was required for 40 mothers (11.4%) after delivery. Maternal morbidity after CS in present study group is described in [Table/Fig-5]. None of the mothers underwent obstetric hysterectomy.

Maternal morbidity (postoperative)	N (%)
No morbidity	317 (90.6)
Postpartum haemorrhage	6 (1.7)
Paralytic ileus	5 (1.4)
Puerperal fever/sepsis	6 (1.7)
Surgical site infections/wound dehiscence	16 (4.6)

[Table/Fig-5]: Distribution of study group according to maternal morbidity due to surgical complications.

A total of 10 mothers required HDU admission, and two required CCU admission postoperatively. The remaining 338 mothers (96.5%) were sent to the postoperative ward after CS. No maternal mortality was reported among present study population.

The neonatal morbidity, showing that 206 (59%) newborns had no morbidity has been depicted in [Tabel/Fig-6]. There was only one stillbirth, from Robson's Group 5, which involved a post-CS mother with intrauterine foetal death. There were 13 neonatal deaths among 349 live neonates (3.7%).

Neonatal deaths in Robson's Group 1 accounted for 4 (30.7%), with two cases where CS was performed due to meconium-stained liquor and foetal distress, one neonatal death occurring in a baby delivered by CS in obstructed labour, and one in a mother who had eclampsia. Robson's Group 3 also had 4 (30.7%) neonatal deaths, with two delivered by CS due to foetal distress, one in obstructed labour, and one due to cord prolapse. These two groups (Groups 1 and 3) contributed to the maximum number of neonatal deaths. Additionally, Robson's Groups 4, 5, 6, 9, and 10 each had 1 (7.7%) neonatal death.

Neonatal morbidity	N (%)
Nil	206 (59)
Preterm	46 (13.1)
Meconium aspiration syndrome	53 (15.1)
Birth asphyxia	30 (8.5)
Received phototherapy	8 (2.2)
Sepsis	6 (1.7)

[Table/Fig-6]: Neonatal morbidity among the newborns delivered by the study population.

DISCUSSION

In this study, authors attempted to analyse the CS performed based on Robson's criteria at the study Institute. This is likely the first such attempt from a secondary care centre in Eastern India.

Regarding age distribution, authors found that 84% of the mothers in present study group were above the age of 20 years, which is almost similar to a study done by De A et al., in a tertiary care hospital in India [7], where 90.6% of the women in the caesarean cohort were in the age group of 21-35 years.

Most of the study participants (83.7%) belonged to the lower middle class (Class 4) of the modified BG Prasad socioeconomic scale [6], while the lowest proportion (4.9%) of patients belonged to Class 5. Authors attributed the present result to the fact that populations in Class 4 and Class 5 cannot afford the high costs of delivery in the private sector and thus seek treatment in public sector hospitals, which are free of charge.

In the present study, Robson's Groups 2 (20.9%), 1 (14.3%), 4 (14%), 3 (12.9%), and 5 (12.3%) were the major contributors to the overall CS rates. Though not in the exact same order, this result is quite similar to the study conducted by De A et al., which identified the major contributor groups as 5, 1, and 2 [7]. Present findings contrast with those of Pravina P et al., where Group 5 was the major contributor, followed by Groups 2, 1, and 10 [8].

There are also variations in other studies regarding the major contributor group [9,10]. Jamwal D et al., observed Robson's Groups 2 and 5 as major contributors to CS in their study conducted in 2021 at a Government Medical College in Jammu and Kashmir, India [9]. Kazmi T et al., conducted a study at a tertiary care hospital in Muscat, Oman, and found Group 5 to be the highest contributor, followed by Groups 1 and 2 [10].

While other authors in India, such as Bade P et al., Chavda D et al., and Das RK et al., reported previous CS as the most common indication for CS, present study found foetal distress to be the most common indication, followed by previous CS [11-13]. A large study involving 20,578 mothers conducted by Vila-Candel R et al., from 2010 to 2021 at a university hospital in Spain also identified foetal distress as a leading cause of CS, followed by induction failure, with Robson's Group 2 being the largest contributor [14]. A study

conducted in a tertiary care hospital in Mumbai, India, in 2023 by Rajput H et al., among 2,231 mothers who underwent CS observed that Robson's Group 5 was the largest contributor to total CS, followed by Groups 1 and 10 [15].

Authors conducted present study in a secondary care public hospital with limited human resources, including medical staff, and an absence of infrastructure such as Neonatal Intensive Care Unit NICU/Intensive Care Unit (ICU) and other equipment, which is contrary to other studies. As a result, trials of vaginal birth with proper monitoring were not permitted in many cases of foetal distress, scarred uterus, oligohydramnios, multigravida breech presentation, non progress of labour, and hypertensive disorders in pregnancy. These cases were treated as high-risk pregnancies, and quick decisions for CS were made due to concerns about increased maternal and foetal morbidity. While many studies have reflected fear of litigation or elective CS as indications for surgery, authors did not observe such indications in present study [16-18].

In present study cohort, 11.4% of patients required blood transfusions during their hospital stay, which is significantly higher compared to the observation made by Menon VPS and Rajan R, (7.6%) [19]. The prevalence of anaemia in pregnancy within present study group, attributed to lower socioeconomic conditions, is likely the cause of these findings.

The majority (90.6%) of the mothers in the study cohort experienced no morbidity after the CS. However, 4.5% had surgical site infections, 1.7% experienced atonic postpartum haemorrhage, 1.4% had paralytic ileus, and 1.7% developed puerperal fever. Santhanalakshmi C et al., observed maternal morbidity (both intraoperative and postoperative) in 20% (104 out of 530 mothers), with 39 out of 104 (38%) developing wound infections and one maternal death [20]. Kose V and Sadhvi K, in their 2020 study at a tertiary care hospital in Nagpur, India, reported maternal mortality in 206 out of 1,461 mothers (14.09%), with the majority due to wound gaping and infection [21]. These observations contrast with present findings. Early decision-making, good postoperative care, and a well-sterilised operating theatre may account for the comparatively lower maternal morbidity in present study.

Authors recommended conducting regular CS audits using the Robson's classification in every hospital to monitor and compare justified CS rates among different maternity units. Data can also be shared through a platform established by the WHO [22]. This global interactive platform allows hospital or facility-level data on CS and perinatal outcomes, using the Robson's classification system, to be uploaded. Using this platform, monitoring and comparison of different trends in CS across various settings can be achieved. This may aid in evaluating current policies and formulating future strategies to reduce unjustified CS rates.

Limitation(s)

Since, the study was carried out in a single centre, the findings cannot be generalised to represent the reasons for CS referrals overall. The classification was applied retrospectively, and the results could have been affected by missing data in certain sections. Institutional protocols for defining situations like foetal distress, non-progress of labour, and failed induction were not available, and the individual preferences of the attending gynecologist might have influenced the choice of CS.

CONCLUSION(S)

The increased rate of CS is undoubtedly worrisome. Standardised Institutional guidelines for defining situations like foetal distress, non progress of labour, and failed induction, followed by thorough evaluation and individualisation of indications, are necessary. Regular audits of CS, adequate training for instrumental delivery and Vaginal Birth After Caesarean (VBAC), and Departmental meetings involving paediatricians are required to analyse the indications and decisions for CS as well as the outcomes. These measures can help limit the C-section rate. The Robson's global platform can also assist in evaluating ongoing policies and in formulating future policies.

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PARTICULARS OF CONTRIBUTORS:
1. Senior Resident, Department of Obstetrics and Gynaecology, Jalpaiguri Government Medical College, Jalpaiguri, West Bengal, India.
2. Professor, Department of Obstetrics and Gynaecology, Jalpaiguri Government Medical College, Jalpaiguri, West Bengal, India.
3. Assistant Professor, Department of Obstetrics and Gynaecology, Jalpaiguri Government Medical College, Jalpaiguri, West Bengal, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Selim Akhtar,
Raikatpara, Ward No. 2, Jalpaiguri-735101, West Bengal, India.
E-mail: s.akhtar19841984@gmail.com

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