

Caesarean Section Analysis of the Rate According to Robson Ten Group Classification

R. Srividhya¹, K. Jhansi Rani²

^{1,2} Department of Obstetrics and Gynaecology, Kakatiya Medical College, Warangal, Telangana, India.

ABSTRACT

BACKGROUND

In current and subsequent births, Caesarean sections bear their own risks for maternal and perinatal morbidity and mortality. In contrast with vaginal delivery, Caesarean section has increased risk of blood transfusion, hysterectomy and death and the risk of uterine rupture, placenta accreta and placenta previa in future pregnancies is also increased. We wanted to analyse the Caesarean section rate using Robson ten group classification system & identify the leading groups contributing to high caesarean section rates using Robson ten group classification system.

METHODS

This observational descriptive study enrolled 11,090 women who underwent delivery, of whom 5117 (46.14 %) women delivered vaginally and 5973 (53.86 %) women delivered through Caesarean section.

RESULTS

Overall caesarean section percentage was 53.86 %. Major contributors for the CSR were Group 5, 2 and 1 in that order. CS rate in Group 5 and 1 is relatively increased. Ratio of relative size of Group 1 and 2 is 1:2 indicating a greater number of prelabour caesarean sections in nulliparous women. Caesarean section rate in Group 1 and 2 was 15.7 % and 20.1 % respectively. The main indications for caesarean sections being fetal distress, non-progressive labour and severe oligohydramnios / anamnios. Relative size of Group 1 and 5 was 47.3 % stating that most of the obstetric population was in Group 1 and 5. Caesarean section rate in Group 3 and Group 4 was relatively higher than expected; this may be due to our institute being a referral center. Group 5 contributed 45.7 % to overall caesarean section rate.

CONCLUSIONS

Standardisation of indication of Caesarean deliveries, regular audits and definite protocols in hospital will aid in decreasing the Caesarean section rate in hospital.

KEYWORDS

Kidney Size, Ultrasound Assessment, Age Groups

Corresponding Author:

*Dr. K. Jhansi Rani,
Kakatiya Medical College,
Warangal, Telangana, India.
E-mail: Kjhansiransi123@gmail.com*

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BACKGROUND

Caesarean sections are the most commonly performed life-saving procedures. Caesarean section rates have risen in recent decades, not only in developed countries, but also in developing countries.^{1,2,3} Unfortunately, in our economic background, India is hardly equipped especially in a rural setting to handle the unintended consequences of this procedure. There is no empirical evidence for ideal caesarean section rate. Women who need caesarean section should actually receive them. In 1985 WHO stated that caesarean section rate should be less than 15 %.^{1,2} The rise in Caesarean section rates (CSR) is seen not only in high-risk patients but also in the group of low-risk patients, especially the nulliparous singleton foetus with vertex presentation without other complications. Caesarean sections bear their own risks in present and subsequent pregnancies for maternal and perinatal morbidity and mortality. In contrast to vaginal delivery,^{1,2} an increased risk of blood transfusion, hysterectomy, and death is associated with caesarean section, and there is also an increased risk of uterine rupture, placenta accreta, and placenta previa in future pregnancies. There are several factors affecting caesarean section rates: teaching versus non-teaching hospitals, private versus public hospitals, availability of anaesthetic, paediatric and blood bank facilities round-the-clock. CS is considered relatively safe and some women prefer to a CS to vaginal delivery (CS on maternal request). Patients will have longer stay in hospital and increased morbidity when compared to a vaginal delivery.⁴

The introduction of successful interventions to minimize the incidence of caesarean sections involves a detailed case-by-case analysis to determine the most frequent categories of patients undertaking this procedure. The lack of a formal globally agreed classification for tracking and comparing caesarean section rates is a factor that prevents this increase and its underlying cause from being better understood. Robson Ten Group Classification System (Robson ten group classification system) in 2001 to evaluate and organize the caesarean sections into different categories. Robson ten group classification system determines the high percentage of the caesarean section category and is ideal for long-term monitoring and international comparison of this rise in trend in the caesarean section.^{1,2} A recent analysis using the Robson Ten Group Classification System to evaluate the caesarean section rate in our hospital was done.

METHODS

A hospital based descriptive observational study is conducted in the labour wards of Department of Obstetrics and Gynaecology at Government Maternity Hospital, affiliated to Kakatiya Medical College, Warangal.

All the pregnant women who delivered from February 2018 to July 2019 in the labour ward were included and were classified according to Robson ten group classification system. Ethical clearance for the present study was

obtained from KMC institutional ethics committee on human research.

Inclusion Criteria

All pregnant women who have been in labour with a gestational age greater than or equivalent to 20 weeks. Robson ten group classification system was used.

Statistical Analysis

Microsoft Excel 2017 was used to enter the data and the data was analysed using Epi-Info version 7. Data was summarised in percentages & proportions. Pie charts and bar diagrams were used to depict the diagrammatic representation of results. To evaluate any correlation between variables with a significance level of 5 % (p < 0.05 considered to be statistically significant), the chi square test was used.

RESULTS

A total of 11,090 women underwent delivery during the study period. Of whom 5117 (46.14 percent) women delivered vaginally and 5973 (53.86 percent) women via the Caesarean section. The data collected was coded and entered into the spreadsheet for Microsoft Excel. The information was examined, and the final findings and conclusions were interpreted as follows. The total number of deliveries over one and a half years in this study was 11,090, of which 46.14 % were vaginal deliveries and 53.86 % were Caesarean sections.

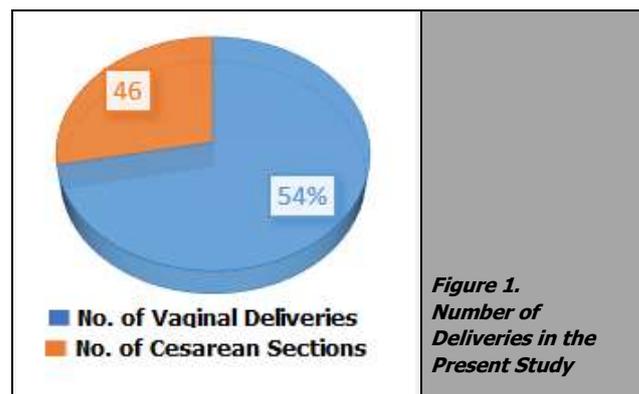


Figure 1. Number of Deliveries in the Present Study

		Number of Women (N = 5973)	%age
Age	18 – 20	597	9.99
	21 - 25	2955	49.47
	26 – 30	1600	26.80
	31 – 35	697	11.67
	36 - 40	86	1.44
	41 – 45	30	0.50
	46 - 50	08	0.13
Total	Booked	4409	73.82
	Unbooked	1564	26.18
Number of CS Cases	Elective caesarean sections	1985	33.23 %
	Emergency caesarean sections	3988	66.77 %

Table 1. Details of Patients in the Present Study

The mean age of women in the study was 25.44. Most patients were between 20 to 29 years. In this study, 73.81 % women were booked cases and 26.18 % were unbooked cases. In this study, majority 3988 (66.77 %) of the patients underwent emergency Caesarean sections. 1985 (33.23 %) underwent elective Caesarean sections.

Gestational Age	No. of Vaginal Deliveries	No. of Caesarean Sections	Total No. of Deliveries
< 37 weeks	684 (74.84 %)	230 (25.16 %)	914 (8.24 %)
> 37 weeks	4433 (43.56 %)	5743 (56.44 %)	10,176 (91.76 %)

Table 2. Number of Vaginal and Caesarean Deliveries in Preterm and Term Deliveries

In this study, 8.24 % were preterm deliveries, 91.76 % were term deliveries. In pre-term deliveries, 74.84 % were vaginal and 25.16 % were Caesarean sections. In term deliveries, 43.56 % were vaginal deliveries and 56.44 % were Caesarean sections.

Indication	Group				Total
	1	2	3	4	
Fetal distress	471	150	143	39	803
Failed induction	0	277	0	75	352
Failure to progress	283	67	57	09	416
CPD	51	307	0	0	358
IUGR Anamnios / Severe	0	81	0	41	122
Oligohydramnios	13	221	04	123	361
Macrosomia	02	05	11	34	52
Severe Pre-eclampsia	0	46	0	14	60
Antepartum eclampsia	0	05	0	05	10
Second stage arrest	21	07	02	0	30
MSL	47	09	31	07	94
Abruption placenta	05	02	06	01	14
Bad Obstetric History (BOH)	0	04	0	03	07
Prolonged PROM	07	0	02	0	09
Persistent OP Position	05	0	01	0	06
Face presentation	03	0	01	0	04
Cord presentation	03	0	05	0	08
Brow presentation	02	0	0	0	02
Precious pregnancy	03	11	0	0	14
Deep Transverse Arrest	06	03	03	0	12
Obstructed labour	16	03	02	0	21
Doppler changes	0	03	0	02	05
Total	938	1201	268	353	2760
(N = 2760)	(33.99 %)	(43.51 %)	(9.71 %)	(12.79 %)	(100 %)
Contribution overall to CS rate (N = 5973)	15.70 %	20.11 %	4.49 %	5.91 %	46.21 %

Table 3. Indications of Caesarean Sections in Robeson's 1 - 4

Groups 1 and 2 are nulliparous patients with singleton cephalic pregnancies of approximately 37 weeks, while groups 3 and 4 are multiparous patients with similar features. The difference between the groups is that patients in groups 1 and 3 experience spontaneous labour, while patients in groups 2 and 4 experience induction of labour or termination of the section prior to the start of labour. In this study, group 2 was the second major contributor to the Caesarean section rate, followed by group 1. In the four classes followed by failure to develop, severe oligohydramnios and cephalopelvic disproportion, the most common symptom of Caesarean sections was fetal distress.

In this study, a total of 135 women were allowed vaginal birth after Cesarean, of whom 82 women had successful vaginal birth after Cesarean and 53 women had failed vaginal birth after Cesarean and had undergone repeat Caesarean section.

Indications of repeat Caesarean section in failed vaginal birth after Cesarean were non-progressive labour (49.1 %), fetal distress (32.1 %) and suspected scar rupture (18.8 %).

Indication of Repeat Caesarean Sections	Analysis of Group-5	
	Number	Percentage
Allowed for VBAC	135	4.8 %
Repeat Caesarean sections	2678	95.2 %
Total no. of cases in Group V	2813	100 %
Not willing for VBAC	1532	56.1 %
Not eligible for VBAC	824	30.2 %
Failed VBAC	53	1.9 %
Previous 2 Caesarean sections	310	11.4 %
Previous 3 Caesarean sections	12	0.4 %

Table 4. Sub Analysis in Group 5

Indication for Caesarean sections failed VBAC	Outcome in Women in VBAC Group	
	Number	Percentage
Successful VBAC	8121	6508.373 %
Failed VTOBLAACC	5838	3491.737 %
Total women allowed for VBAC	1359	100 %
Failure to progress	26	49.1 %
Fetal distress	17	32.1 %
Suspected scar rupture	10	18.8 %
Total	53	100 %

Table 5. Outcome in Women in VBAC Group

Indication of Primary Caesarean Sections	Group X	
	Number	Percentage
Previous Caesarean sections	90	39.13 %
Primary Caesarean sections	140	60.87 %
Total LSCS in Group X	230	100 %
Abnormal Doppler changes	40	28.57 %
Antepartum eclampsia	18	12.86 %
Severe PE	15	10.71 %
Anamnios	11	7.86 %
PROM	9	6.4 %
Abruption placenta	12	8.57 %
Others	35	25 %
Total	140	100 %
Previous Caesarean section in labour not willing for VBAC	23	25.56 %
Severe Preeclampsia	16	17.7 %
Antepartum Eclampsia	06	6.6 %
PROM	9	10 %
Others	36	40 %
Total	90	100 %

Table 6. Analysis of Caesarean Sections in Group 10

In group 10 total number of Caesarean sections were 230. Out of whom 90 (39.13 %) were repeat Caesarean sections and 140 (60.87 %) were primary Caesarean sections. In primary Caesarean sections, most common indication being abnormal doppler changes (28.57 %) followed by antepartum eclampsia (12.86 %). In 90 women who underwent repeat Caesarean section, most common indication was previous Caesarean section, not willing for vaginal birth after Cesarean (25.56 %) followed by severe pre-eclampsia (17.77 %).

DISCUSSION

A significant measure for obtaining critical obstetric care is the caesarean section rate. For classifying Caesarean sections, many classification schemes have previously been suggested. Michael Robson developed the Robson ten group classification system (Robson Ten Category Classification System) for the classification of Caesarean sections in 2001. This classification was established as the most suitable method to address existing international and local needs by two comprehensive assessments carried out at the WHO.⁵ The WHO Statement (Geneva 2014)

recommends the use of the Robson classification as the global standard for the assessment, tracking and comparison of Caesarean section rates within healthcare facilities.^{1,2,4} Caesarean sections have long-term consequences for healthcare facilities. It is therefore necessary to establish, at the institutional level, the indications for Caesarean sections, which provide data on labour and delivery management. This one and half year descriptive observational study was conducted during the period of 1st February 2018 to 31st July 2019 in the labour room of Government Maternity Hospital affiliated to Kakatiya Medical College, Warangal. The study recruited a total of 11,090 pregnant women who delivered during this time. All women with gestational age > 20 weeks of gestation who were in labour were categorised according to Robson ten group classification system, of which 5117 (46.14 percent) women delivered vaginally and 5973 (53.86 percent) women delivered by Caesarean section.

Demographic Data

Average age of the women undergoing Caesarean section in this study was 25.44 which was similar to other studies.

Overall Caesarean Section Rates

The Caesarean section rate in the current study was 53.86 percent. This high Caesarean section rate is clarified by further referrals from our hospital. WHO indicates that Caesarean section rates higher than 10 percent are not correlated with reductions in maternal and newborn mortality rates at population level. 1, 2' Our higher Caesarean section rates represent the rate of the hospital section and not the rate of the population section. Our Caesarean section rate is comparable to the research performed by Elton C et al. in Brazil and Samba et al. in which the Caesarean section rate was 46.6 % and 46.9 % respectively, but it was 25.80 % higher than other studies conducted by Prameela et al., Tahira Kazmi et al. was 20.3 %.^{6,7,8,9} In this study, prior Caesarean section, fetal distress, unsuccessful induction of labour and failure to progress were the main signs for Caesarean section.

Previous Caesarean Section

Previous Caesarean section was responsible for 45.7 % of Caesarean sections performed in our study. This is similar to studies conducted by Sneha B in South India (40.1 %), Tahira Kazmi in Oman (33.3 %) and R C Prameela at Mysore in India (32.8 %)^{8,9,10}; different from studies conducted by Samba et al. in Ghana (11.2 %), V Makhanya et al. in South Africa (17.2 %) Ljiljana B et al. at Croatia (26.9 %) and Elton C et al. in Brazil (27.3 %).^{7,8,9}

Fetal Distress

The number of cases of fetal distress in this study was 803 and is the second most common sign for Caesarean section, accounting for 13.44 percent of Caesarean deliveries

compared to 37.7 percent in a study performed by V Makhanya et al. in South Africa.¹¹ This marked difference can be due to the method of diagnosis of fetal distress. Randomized controlled studies have shown that electronic fetal monitoring results in higher rates of Caesarean delivery without enhancing neonatal outcomes.¹² According to the World Health Organization (WHO), periodic auscultation of the fetal heart rate during the first stage of labour should be tracked, i.e., every 15 minutes and every 5 minutes during the second stage of labour. Electronic fetal monitoring (EFM) should be used in carefully selected patients e.g., patients undergoing induction of labour, fetal growth restriction (FGR), gestational diabetes mellitus (GDM). However, the majority of patients have electronic fetal monitoring during labour due to the risk profile of patients managed at our hospital.⁴ Improving fetal monitoring during labour which theoretically decrease the rate of Caesarean delivery.

Failure to Progress

6.96 percent of the overall Caesarean section rate was responsible for non-progress of labour in this report. Nulliparous women have a higher risk of labour non-progress (16 % in this report). In this report, 10 % of multiparous women have undergone Caesarean section due to labour non-progress. In this low-risk category, the diagnosis and routine management of labour in these patients needs review.¹³ Non-progress of labour may also be targeted as an indicator of reducing Caesarean section rates. The use of a professional pelvic examination to exclude cephalopelvic disproportion, the use of a partogram to track and manage labour, the judicious administration of oxytocin to increase labour, as well as the presence of a qualified worker can reduce the number of Caesarean sections for non-progress in labour. The presence of a supportive partner during work not only shortens the length of work, but also decreases the risk of delivery of emergency Caesareans.

The new policy at our hospital does not allow a partner to be present in the office, and this could be one of the strategies for decreasing Caesarean section rates and improving patient satisfaction. The above results indicate that clinical guidelines for common indications for the Caesarean section need to be established to ensure proper conduct of Caesarean sections and to improve patient care.

Analysis Using Robson Ten Group Classification System

The Robson Ten Group Classification System was used in this research to illustrate the unique subgroups of women who made the most important contributions within the study environment to the Caesarean section rate. In our hospital, the high Caesarean section rate is due to women with previous Caesarean section, single, cephalic, > 37 weeks, i.e. group 5 with 45.7 % and nulliparous, single, cephalic, > 37 weeks, induced or Caesarean section before labour, i.e. group 2 with 20.1 % and nulliparous, single, cephalic, > 37 weeks in spontaneous labour, i.e. group 1

with 15.7 %. A study conducted in Tanzania by Litorp et al. reported a 27 percent Caesarean section average, with groups 1,3 and 5 contributing 12 percent, 12 percent and 14 percent respectively.¹⁴

Analysis in Each Group

Types 1 and 2 (Nulliparous Pregnancy, Singleton Pregnancy, Cephalic Pregnancy > 37 Weeks during Spontaneous Labour and Pre-Labour Induction or Caesarean Section)

Nulliparous patients in this study included most of the obstetric population in the word, i.e., 38 percent (group 1 is 21.9 percent and group 2 is 16.1 percent), relative to most studies. They are the second and third most important contributors to the incidence of the Caesarean section. Group 1 contributed 15.7 percent and Group 2 contributed 20.1 percent, i.e., 35.8 percent (53.86 percent) to the total Caesarean section average. In these classes, the main signs of Caesarean sections are fetal distress, failure to develop, and unsuccessful induction. This is similar to studies performed by Sneha B et al. 12.4, Makhanya V et al. 14.9 %, and Elton C et al. 15.6 %.^{6,10,11}, where group 1 and 2 are the key contributors after group 5 to the overall Caesarean section average.

Groups 1 and 2 are the most important groups of all obstetric populations because they have the greatest disparity in management and efficiency. Appropriate diagnosis and control of the first and second phases of the population is also a key technique in this culture for the reduction of Caesarean sections. Training on the interpretation of fetal cardiotocographic recordings and the accurate use and interpretation of partogram play an important role in reducing the occurrence of the primary Caesarean section, as the major contributors to Caesarean sections were fetal distress and missed induction.

The main thing is to individualize every job and if both mother and fetus are well, do not set a time limit in a tertiary centre as long as monitoring is fine. Research shows that the decrease in labour induction in group 2 is associated with a decrease in the Caesarean section rate.

Group 3 and 4 (Multiparous, Singleton, Cephalic Pregnancy ≥ 37 Weeks without a Previous Caesarean Section in Spontaneous Labour and Induction of Labour or Caesarean Section before Onset of Labour)

In this study, group 3 has majority (19.8 %) of obstetric population next to group 5 and group 1 as compared to other studies. In the current study group 3 and group 4 contributed to 10.4 % to the Caesarean section rate. Fetal distress, severe oligohydramnios and failed induction being the most common indications of Caesarean sections in group 3 and group 4. Caesarean sections are being unnecessarily performed in these two groups because of over diagnosis of fetal distress.

Group 5 (Previous Caesarean Section, Singleton, Cephalic Pregnancy ≥ 37 Weeks)

In this study, group 5 is the largest contributor to the Caesarean section rate 1 i.e., 45.7 %. This is similar to

other studies all over the world. The contribution of group 5 to overall Caesarean section rate in study conducted by Ljiljana et al. was 4.12 % to 15.30 %¹⁵, by Amita Ray et al. was 8.29 % to 28.9 %¹⁶, by R C Prameela was % to 25.80 %⁸, by Samba et al. was 11.2 % to 46.9 %⁷, and Makhanya V et al. was 17.2 % to 42.4 %¹¹. Women with one prior lower segment caesarian (LSC) are eligible for trial of labour after Caesarean as per policy at our institute. An option of either vaginal birth after Cesarean or repeat Caesarean section delivery is given to these patients. If eligible for vaginal birth after Cesarean and after advice on the benefits and risks associated with it, vaginal birth after Cesarean will be permitted for women. There were 2813 females in group 5 in the current study. For vaginal birth after Cesarean, 135 women were permitted, and 2678 women underwent a repeat Caesarean section. Of these 2678, 310 women had previous 2 Caesarean sections, and 12 women had previous 3 Caesarean sections. Of the 135 women allowed for vaginal birth after Cesarean, 82 women (60.7 %) had successful vaginal birth after Cesarean and 53 women (39.3 %) had a repeat Caesarean section. The majority of Caesarean sections in patients with one prior Caesarean section is responsible for failure to progress (49.1 percent) and fetal distress (32.1 percent). Although these patients were given labour trials, the rate of refusal for labour trials was still high for these patients.

Group 6 to 9 (Pregnancies Complicated by Breech, Multiple Pregnancies and Abnormalities)

While the Caesarean section rate is high in these groups, the groups account for a small proportion of the obstetric population and their contribution to the Caesarean section rate is therefore low. Groups 6, 7, 8 and 9 contributed 2.3 percent, 0.6 percent, 1.0 percent and 0.3 percent respectively to the overall Caesarean section rate in the current report. A significant clinical technique to minimize the Caesarean section rate in this population is the external cephalic version and is encouraged from 36 weeks' gestation unless there are no contraindications.¹⁷

Group 10 (Patients with Single, Cephalic Pregnancies at ≤ 36 Weeks Including Previous Caesarean Sections)

Group 10 contributed 3.85 percent to the overall Caesarean section rate in this report. Similar findings were seen in studies performed in Brazil by Elton C et al. in which Group 10 contributed 7.7 percent to the overall Caesarean section rate.⁶ A total of 230 women underwent Caesarean sections in this sample. Of which 140 (60.9 percent) and 90 (39.1 percent) were women with previous Caesarean section were primary Caesarean sections. Abnormal shifts in Doppler (28.6 percent) and antepartum eclampsia (12.9 percent) were significant contributors in this community to the primary Caesarean sections.

CONCLUSIONS

Because of the wide range of patients' health status, defining an ideal Caesarean section rate in our environment might

not be feasible. The trick to minimising the total Caesarean sections is to decrease the primary Caesarean section rates. Fetal distress, failure to progress, and cephalopelvic disproportion were the major contributors to primary Caesarean sections. After careful patient selection and after counselling of pregnant women about its risks and benefits, trial of labour after Caesarean should be provided to women with previous Caesarean section. The Caesarean section rate could be reduced by adjusting the criteria for failure to progress and fetal distress, educating and enabling obstetricians to perform versions when not contraindicated. Standardisation of Caesarean delivery sign, routine audits and definite hospital guidelines would help in decreasing the hospital Caesarean section rate.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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