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ORIGINAL RESEARCH ARTICLE

Cesarean Section Rate According to Robson's Criteria- A Retrospective Analysis in a Tertiary Care Rural Centre of North India

Ruchica Goel[1], Shanti Sah[2], Jai K. Goel[3]

ABSTRACT

Introduction: The cesarean section rate has been rising over last five decades worldwide. The reasons are electronic fetal monitoring during labor, increasing number of pregnancies following infertility treatment, increasing number of post-cesarean pregnancies, changing obstetrics trends regarding vaginal breech or operative deliveries, and medicolegal concerns. The present study analyses cesarean section rates according to Robson's criteria in our center.

Material and Methods: The obstetrics record of all women admitted in the labor unit from June 2013 to May 2018 were retrieved and analyzed based on their age, parity, gestation age, mode of delivery and grouped according to Robson's classification.

Results: A total of 13392 women were delivered in the labor unit in 5 years, during which 35.3% of patients had a cesarean section. Among cesarean section, primary and repeat cesarean were 57.3 and 42.7%, respectively. Most frequent indication was fetal distress (26.7%) followed by non-progress (12.6%) and scar tenderness (12.1%). Among primary and repeat cesareans the commonest indications were fetal distress (38.5%) and scar tenderness (28%), respectively. Robson's group V had the maximum cesarean rate (36.2%) followed by group I (16.9%) and group II (15%). The annual trends of cesarean are almost similar in various Robson's categories- group I (17.3-22.5%), group II (11.1-14%) and Group V (33.4-39.9%).

Conclusion: Robson's group I, II and V were found to be contributing more than 50% of the cesarean section rate. Modifiable factors for reducing cesarean rate would be to improve successful induction of labor, decreasing primary cesarean rate, hence the chance of repeat sections.

Keywords: Cesarean section rate, Robson's criteria

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INTRODUCTION

Cesarean section (CS) has been controversial in the practice of obstetrics. There has been a progressive increase in the rates over the last decades.[1] These rising CS rates (CSR) raise concern for public health globally due to the potential maternal and perinatal risks associated with it.[2] CS may be a lifesaving procedure when indicated but the rising trends are debatable.

There are various reasons discussed regarding the rising trends of CSR, which depends upon decision-making by patients or physician. The patient-centric reasons are patient preference and fear of vaginal delivery while the physician-centric reasons may depend upon the patient's clinical scenario. These may be electronic fetal monitoring during labor, increasing number of pregnancies following infertility treatment, multifetal pregnancies, elderly gravida, increasing number of women with previous C-section or changes in obstetric training regarding instrument delivery.[3] Moreover, scientific progress, social and cultural changes and increased legal accountability are few other reasons for an increase in CSR.

Strategies to limit CSR are constantly debated in various scientific forums. In 1985 world health organization (WHO) justified 10–15% as an ideal CS rate.[4] This led to various controversies as this could not reflect CSR in an individual healthcare facility where obstetric population, resources and local clinical protocol may vary tremendously.

The Robson criteria is a ten-group classification system (RTGCS) using 10 mutually exclusive and inclusive categories for CS i.e., all women can be classified into only one group. The advantage of this classification are that it is simple, robust, reproducible and clinically relevant. An audit of the CS deliveries using Robson's classification helps to interpret which group contributes to the increase in CSR. The present study was done to analyze the rate of CS in group of patients presenting in the labor ward and then compare the result with WHO

Table 1: Robson's 10-group classification

S.No.	Group
1	Nulliparous, single cephalic, ≥37 weeks, in spontaneous labor.
2	Nulliparous, single cephalic, ≥37 weeks, induced or cesarean section (CS) before labor.
3	Multiparous (excluding previous CS), single cephalic, ≥37 weeks, in spontaneous labor.
4	Multiparous (excluding previous CS), single cephalic, >37 weeks, induced or CS before labor.
5	Previous CS, single cephalic, ≥ 37 weeks.
6	All nulliparous breeches.
7	All multiparous breeches (including previous CS).
8	All multiple pregnancies (including previous CS).
9	All abnormal lies (including previous CS).
10	All single cephalic, <37 weeks (including previous CS).

multicountry survey on maternal and newborn health (WHO MCS). The indications for primary and secondary cesarean section were also analyzed.

MATERIALS AND METHODS

This study was conducted in the Department of Obstetrics and Gynaecology, Shri Ram Murti Smarak Institute of Medical Science, Bareilly, a tertiary care teaching hospital catering to a rural population. Retrospective delivery data was retrieved from June 2013 to May 2018 (5 years) and grouped using RTGCS (Table 1).[5,6]

Five basic obstetric characteristics (parity, gestational age, presentation of fetus, number of fetus and onset of labor) were used to categorize all women admitted for delivery into one of the ten mutually exclusive and totally inclusive groups of RTGCS.

The exclusion criteria were all women less than 28 weeks of gestation.

The distribution of data in various groups was analyzed and each group's individual contribution in total CS was assessed. Indication of cesarean section was noted. The trend over the 5 years in terms of primary and secondary CSR and the indication was also seen so as to take future remedial action.

RESULTS

In our study period from June 2013 to May 2018 a total of 13,392 patients delivered, and 4,733 patients underwent CS. The 5 years overall CSR was 35.3%. (Table 2)

The majority of patients were in the age group 21 to 34 years (80.9%) followed by age group less than 21 years (14.1%) and the age group 35 years and more (5%). Primigravida composed 43.2% of the study population while 52.6% were parity between 2–4 and only 4.3% were

Table 2: Yearwise distribution of total cases delivered and cs

Year	Total deliveries	Cesarean section
2013-14	2565	746
2014-15	2745	856
2015-16	2594	1026
2016-17	2928	1081
2017-18	2560	1024
Total	13392	4733

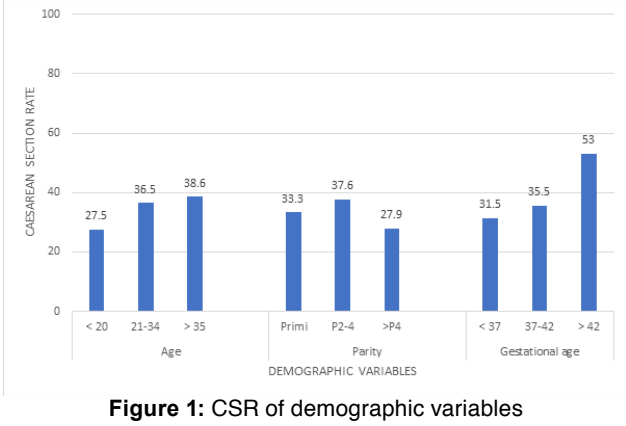

Figure 1: CSR of demographic variables

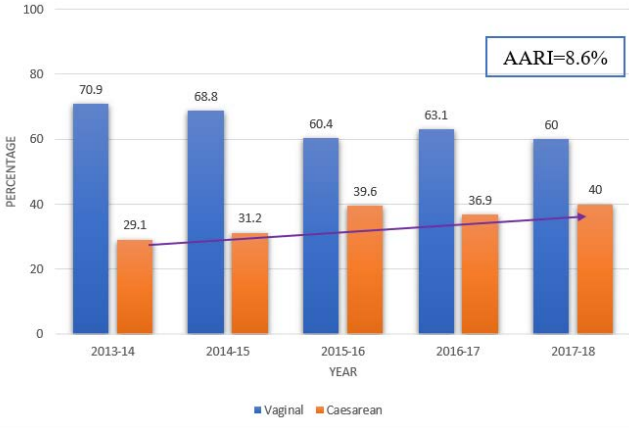

Figure 2: Trends of mode of delivery

grand multipara. The majority (87.1%) had term deliveries while 11.5% had preterm deliveries and very few (1.5%) had post-term deliveries.

CSR was higher (38.6%) in age group more than equal to 35 years compared to 36.5% in 21–34 years and 27.5% in less 21 years. Among parity groups, CSR was highest in parity 2–4 (37.6%) followed by primigravida (33.3%) and grand multi (27.9%). Post-term pregnancy had CSR 53% followed by 35.5% in term and 31.5% in preterm pregnancies. (Figure 1)

The CSR showed an increasing trend over 5 years from 29.1% in 2013 to 14 to 40% in 2017 to 18. This showed annual rate of rise of 8.6%. (Figure 2)

There was a rising trend in both primi and multigravida. In primigravida the CSR rose from 27.8–35.7% and similarly, in multigravida, the rise was from 30–43.6% (Figure 3)

Primary CSR had a downward trend from 60.5 to 56.5%

Figure 3: Trends of csr in primigravida and multigravida

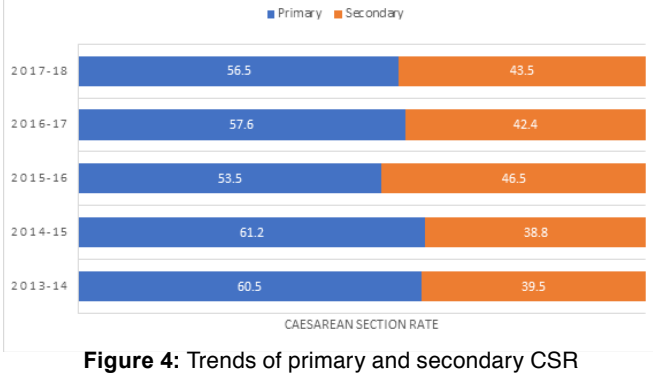

Figure 4: Trends of primary and secondary CSR

while secondary CSR had an increasing trend from 39.5 to 43.5%, though not clinically significant (Figure 4)

In our study, Robson group 3 had a maximum number of patients (23.1%) followed by Robson group 1 (19.9%) which had CSR 12.5 and 30.2%, respectively. The CSR were extremely high in group 9 (92.7%), group 5 (85.7%), group 6 (77.3%) and group 8 (57%). The largest contribution to total CS was made by group 5 (36.4%) followed by group 1 (17%). Group 2 contributed next by 15.1% and group 3, the largest group in our study population, contributed 8.2%. (Table 3)

Our study showed that there was an increase CSR in groups 1 and 3 when compared to WHO-MCS which had high likelihood of spontaneous vaginal delivery.

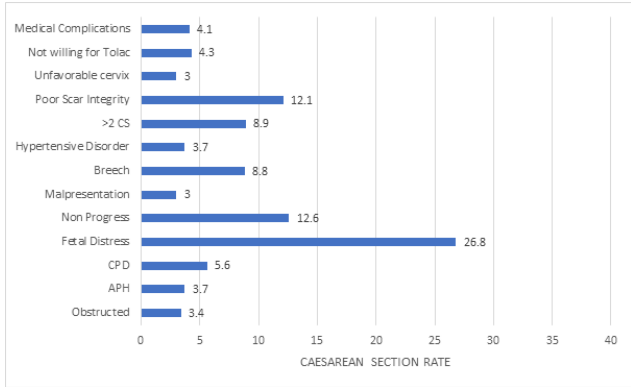

Figure 5: CSR in various indications of delivery

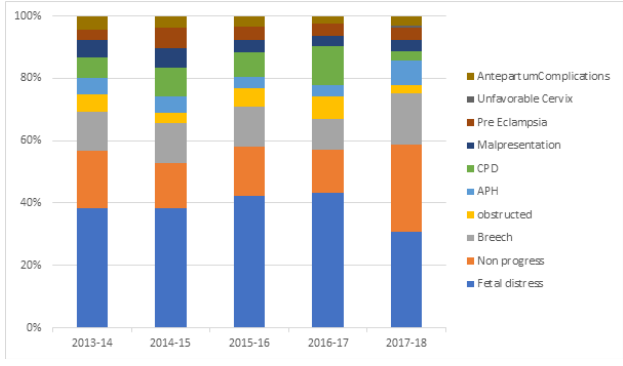

Figure 6: Relative frequencies of indications in primary CS

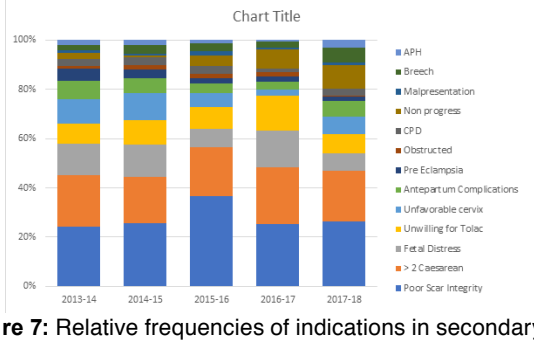

Figure 7: Relative frequencies of indications in secondary CS

Table 3: Relative size of group and their relative contributions

Robson's group	*Total delivery N (%)*	*Cesarean section (A)*	*Group csr (A/nx100)*	*Absolute group contribution to overall csr (a/nx 100)*	*Relative contribution of group to overall csr (a/ax100)*
Group1	2663 (19.9)	803	30.2	6.0	17.0
Group 2	2225 (16.7)	715	32.1	5.3	15.1
Group 3	3098 (23.1)	387	12.5	2.9	8.2
Group 4	1252 (9.3)	149	11.9	1.1	3.1
Group 5	2009 (15.0)	1721	85.7	12.9	36.4
Group 6	300 (2.2)	235	77.3	1.8	5.0
Group 7	304 (2.3)	183	60.2	1.4	3.9
Group 8	244 (1.8)	139	57.0	1.0	2.9
Group 9	124 (0.9)	115	92.7	0.9	2.4
Group 10	1173 (8.8)	286	24.4	2.1	6.0
Total	13392 (N)	4733 (A)			

The group CSR for induced labor in nullipara was higher compared to multipara (32.1 vs 11.9%)

The most frequent indication for CS over all 5 years was fetal distress (26.8%) followed by non-progress of labor (12.6%) and poor scar integrity (12.1%) (Figure 5).

In primary CS the most common indication was fetal distress followed by non-progress of labor and breech presentation over the 5-year study period (Figure 6).

For secondary CS it was poor scar integrity, more than one CS and fetal distress (Figure 7).

DISCUSSION

The average global rate of CS is 18.6% (almost 1 in 5 women). There has been an absolute increase of 12.4% and average annual rate of increase (AARI) of 4.4% (1990 to 2014).[7] The second largest absolute increase has been in Asia, from a CSR of 4.4% in 1990 to 19.5% in 2014.

Over the past decade, the increasing trend in cesarean section has become a major public health concern and has resulted in worldwide debates. In order to understand the drivers of these trends WHO in 2014 proposed the use of Robson Classification at the facility level. It was simple, robust, reproducible, clinically relevant and prospective. It also allowed for comparison and analysis of CSR within facilities over time and between facilities.

CSR

The incidence of CS varies significantly both between and within different countries with the highest rate documented in Latin America and Caribbean (42.9%) and lowest in Africa (7.3%).[8]

According to the National Family Health Survey (NFHS) 4, the average CSR in India is 17.2%, ranging from 5.8% in Nagaland to 58% in Telangana. The Indian AARI is higher than the world AARI (8 vs 4.4%). Institutional deliveries have increased by 32% between NFHS 3 and NFHS 4. CSR in a private health facility is more than public health facility (40.9 vs 11.9%). At the state level the highest AARI is in Uttar Pradesh (12.7%).

In our tertiary rural health care centre, a private organization, CSR of 35.3% is higher than average CSR in India, but lower than the CSR in a private health facility. AARI of 8.6% in almost similar to that of national statistics and lower than state.

CSR of the present study is comparable to CSR for private sector (31.3%) in Uttar Pradesh mentioned in NFHS4. It was also similar to CSR (32.6%) in study conducted by Dhodapkar SB *et al.* at a tertiary centre of Puducherry in South India. Some studies have reported a higher CS rate of 48.1 and 49.9%.[9,10]

Study in Korle-Bu teaching hospital, Ghana showed an overall CSR of 46.9%. These rates reflect that CSR cannot be uniform and will vary between facilities because of the study population.

Trends of CSR in primigravida and multigravida

The study by Bhardwaj *et al.* have shown a marginal increase in AARI compared to our present study (9.5 vs 8.6%). The CS rate in multigravida was higher than in primigravida (36.9 vs 33.3%) in our study in contrast to the studies by Bhardwaj *et al.* (38.6 vs 61.8%) and Balakrishnan *et al.*.[11] As suggested by WHO-MCS this could be because of a previous traumatic or prolonged labor experience or to do tubal ligation in settings with poor access to contraception.

Relative size of group and their relative contribution

Robson's classification allows one to identify the main contributor group and thus help formulate strategies to reduce CSR. When comparing our study population to the WHO-MCS reference population, group 5 comprised of a larger proportion (15 vs 7.2%), so relative contribution in this group was more (85.7 vs 50–60%). Group CSR was also higher in group 1 (30.2 vs 9.8%) and 3 (12.5 vs 3%) compared with WHO-MCS. This could be due to illiteracy, disregard for antenatal care and still faith on local midwives/quacks for delivery resulting in complications in delivery.

Trends and indications of primary and secondary CSR

In a study conducted by Jacob KJ *et al.* at Govt Medical College, Thrissur, Kerela the major contribution to overall CSR was by women with previous CS.[12] Ray *et al.* have also shown that women with previous CS contributed maximum to overall CSR followed by induced term primigravidae.[13] Similar findings were seen in our study where secondary CSR had an increasing trend from 39.5 to 43.5%

The most common indication in our study was fetal distress (26.8%) followed by non-progress of labor (12.6%) and poor scar integrity (12.1%). Bhardwaj *et al.* also reported similar findings where the commonest indication was fetal distress (34.9%). The ICMR study by Kambo *et al.* reported on data from 30 teaching institutions in the year 1998 to 1999 and found the most frequent indication to be dystocia (37.5%) followed by fetal distress (33.4%), repeat CS (29%) and mal-presentation (14.5%).[14] Unnikrishnan *et al.* from Mangalore found previous cesarean delivery to be the most frequent (32.7%) indication for CS followed by fetal distress (19.6%) and breech presentation (10.3%).[15]

Globally, study from Pakistan reveals CS rate 45.5% at a military hospital with the commonest indication being repeat CS (44.4%) followed by failed trial of labour (27.1%)

and fetal distress (10.1%).[16] Audit of CS in Srilanka (2010) reported previous CS as most frequent (35.6%) indication, followed by fetal distress (22.3%) and failure to progress (10.8%).[17] while from the United Kingdom reported the top five indications to be fetal compromise (22%) followed by "failure to progress" (20%), repeat CS (14%), breech (11%) and "maternal request" (7%).[18] "Cesarean on Maternal request" has been on a rise globally and in India, and is ethically questionable.

Study by Ann M *et al.* has found that induced primigravidae underwent major proportion of primary sections.[19] Yadav *et al.* have found induced primigravidae contribute even more than the previous CS group to overall CSR.[20] Although this was not so in our study, the maximum contribution was by the previous CS group.

The above discussion highlights that fetal distress, failure to progress and repeat CS are the major indications that should be explored to reduce CS rates. The results demonstrate the need to focus on the care of women in group 1,3 and 5, if CS rates are to be reduced. The similar inference has been suggested in the study conducted by Yadav RG *et al.* at medical college, Baroda, Gujrat.[20] Tura AK *et al.* have in their study showed a major contribution by group 3,1 and 5. A study by Lithorp *et al.* on a data sheet of 137,094 from 2000 to 2011 found that the three largest groups (groups 1, 3 and 5) contributed most to the total CS rate over the study period. [21] However, another study done by Samba *et al.*. in the Korle-Bu teaching hospital, Ghana in 2016 concluded to focus on group 2,4 and 5 to reduce the overall CSR.[22]

Pandey *et al.* suggested that the best way to reduce overall CS is to prevent primary CS.[23]

Decreasing the primary CSR is the key to reducing overall CSR. We need to individualize every labor and as long as monitoring is good and mother and fetus are well, don't need to set a time limit while patient is in tertiary care centre. Labour induction protocols vary worldwide and multiple authors have quoted increasing labor inductions as an upcoming contributor to cesarean deliveries, especially primary CS.

The American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (SMFM) have released joint guidelines for the safe prevention of primary cesarean delivery.[24] The most important point to reduce the overall CS rate is adequate and proper antenatal care. The challenge is to keep the CS rates low without adversely affecting maternal and fetal outcomes. Applying stricter criteria and due diligence in decision-making for primary CS may decrease the high CS rates.

CONCLUSION

Robson's classification is a tool to judge care rather than to recommend care. CS in each group will vary in different hospitals and settings, depending on the capacity, level of complexity, epidemiological characteristics of the population served and local clinical management guidelines. Using the classification overtime will help in auditing the CSR associated with the best outcomes. The challenge is to keep the CS rates low while maintaining safe outcomes for the mother and newborn. This requires continuous auditing of CS.

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