

DOI: <http://dx.doi.org/10.18203/2320-1770.ijrcog20182884>

Original Research Article

## Audit of caesarean deliveries in a tertiary care hospital of northern Andhra Pradesh using modified Robson criteria

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**Received:** 08 May 2018

**Accepted:** 30 May 2018

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### ABSTRACT

**Background:** Today, there is an increased trend in the incidence of caesarean section (CS) rate worldwide particularly in India, even with the lack of evidence supporting considerable maternal and perinatal benefits with higher CS rates. The main objective of our study was to find the incidence of CS rate, auditing the data on the basis of modified Robson criteria, factors responsible for the most common group, to know the changing trends of CS and finally put forth the strategies to reduce CS rate.

**Methods:** This is a retrospective study of 472 CS cases carried out in a tertiary care hospital during the year 2016. All the cases were grouped according to the modified Robson criteria and the data was analyzed. The data were grouped into 3 different slots of 4 months each (FF = first four months; MF = middle four months and LF = last four months of the year 2016).

**Results:** A significant increasing trend was observed in the groups of 2B and 5C where as a significant decreasing trend was noticed in 6C and 7C. The most common indications for caesarean delivery were cephalo-pelvic disproportion (CPD) (28%) and fetal distress (22%) in group 1 whereas in group 2A CPD, fetal distress and failed induction were found to be 12%, 24% and 30% respectively.

**Conclusions:** The change in trend has been noticed in the last few months particularly in 2B and 5C groups suggesting that there is a change in the attitude of obstetricians in conducting caesarean deliveries before the onset of labour rather than performing CS after the onset of labour. Targeting 2B along with 5C would help our efforts in reducing the CS rate.

**Keywords:** Caesarean section rate, Data auditing, Modified Robson criteria, Trend

### INTRODUCTION

Today there is an increased trend in the incidence of caesarean section (CS) rate worldwide particularly in middle- and high income countries, even with the lack of evidence supporting considerable maternal and perinatal benefits with CS rates higher than a certain threshold.

The ideal CS rate should be between 10-15% as WHO recommended and was an accepted norm until 2014.<sup>1</sup> Although CS is a life saving procedure for both mother

and baby, the incidence of neonatal mortality and morbidity did not decrease with the increase in CS rates.

The following reasons have been designated for the rise of CS rates include fear of medico-legal issues, increasing maternal request, increasing malpractice pressure, convenience of scheduled deliveries as well as economic, cultural and organizational factors.

However, ICMR task force study stated after considering data from 30 teaching institutions that the most frequent

indication for the primary CS would be CPD (52.9%), fetal distress (25.8%) and severe PIH/eclampsia (5%).<sup>2</sup>

In 2015, with reference to CS rates the WHO issued an official statement and promoting the use of the Robson classification as a tool for optimizing the CS rate at health facilities.<sup>3</sup>

A systematic review and population based study conducted by WHO stated that CS rates not more than 10-15% is coupled with low maternal, neonatal and infantile mortality.<sup>4</sup>

The CS should be prioritized according to maternal preferences, general risks and benefits of CS, complications associated with CS like uterine rupture and perinatal mortality and morbidity.<sup>5</sup>

In general, CS is more valuable to health care system and is associated with increased risk for both mother and baby. It has the potential to complicate subsequent pregnancies as well as long-term effects that are still being investigated.<sup>6</sup> The complications such as uterine rupture, abnormalities in placental attachment to uterus eg. placenta accreta and percreta, which were strangely rare earlier, are now becoming very common obstetric emergencies.<sup>7</sup>

The vulnerability of uterine rupture in previous CS cases could be due to the relative weakness of the uterine wall at the point of scarring.

The consequence of placental implantation over or adjacent to scarring so that the placenta invades the uterine muscle more deeply which results in the formation of placenta accrete and percreta. And, this is assumed to occur since the scarred tissue from prior CS has a less healthy blood supply and abnormal architecture both at the tissue and cellular level as well.

The CS rates vary significantly by geographical region, which range from 25-35% among States, with the highest being south eastern United States.<sup>8</sup> According to recent data from 150 countries, Latin America and Caribbean region are found to have the highest CS rates and Africa being the least with 7.3%.

In Asia, the highest CS rate was observed in Turkey, Georgia and China of 39.5%, 32.9% and 31.8% respectively.<sup>9</sup> In India, the average rate of CS in 1992 was 2.9%, and has been increased to 17.2% in 2015 ranging from 5.8% in Nagaland to 58% in Telangana.<sup>10,11</sup>

It has been observed from an ecological study that CS rates higher than around 10% are not associated with substantial decreases in maternal and neonatal mortality rates.<sup>12</sup>

Morbidity with CS is nearly 5-10 times higher than vaginal deliveries.<sup>13</sup> Repeat CS contributes as major factor for common failures of CS in our population. The goals to reduce CS in the United States have become less indomitable.

The healthy people 2000 goal was to reduce CS rate to 15% of all births and the goal was revised to 15% for healthy people 2010 among women who had no prior CS and finally in healthy People 2020, the new target for CS is 23.9% among low-risk women in a first pregnancy with a full-term singleton pregnancy and vertex presentation.<sup>14-16</sup>

The moving goal shows uncertainty in assessing the exact rate to enable the best possible maternal and infant outcomes and difficult to judge which intervention can safely reduce use of caesarean section.<sup>17,18</sup>

The main objectives of our study are to find the prevalence rate of CS, auditing the data on the basis of modified Robson criteria, factors responsible for the most common group, to know the changing trends of CS and finally put forth the strategies to reduce CS rate.

## METHODS

The present retrospective observational study has been carried out in the Department of Obstetrics and Gynecology, NRIIMS, Sangivalasa. All the women delivered by caesarean section from 1/1/2016 to 31/12/2016 in antenatal ward were included for the study.

The obstetric information such as parity, mode of previous deliveries, previous CS indications, gestational age, onset of labour, spontaneous or induced labour was taken from all the women who underwent CS in our hospital. Patients were classified on the basis of indications for CS using modified Robson's criteria.

Indications for each CS were noted in the structured proforma prepared on the basis of modified Robson's criteria. A total of 472 cases were distributed according to the modified Robson's criteria and data was analysed.

To study the changes in trends, the data were grouped into three different slots of 4 months each (FF-1/1/2016 to 30/04/2016, n=161; and MF-1/05/2016 to 31/08/2016, n=127 and LF-1/9/2016 to 31/12/2016, n=184) to study the changes in the trends of caesarean births.

The changing trends notified were analyzed in each group on the basis of modified Robson's criteria and the data of FF, MF and LF was compared.

'Z' test was used to test the difference between the groups, to know the statistical significance and the p-value of <0.05 was considered to be significant.

**Table 1: Description of modified Robson criteria.**

Group	Modified Robson
1	Nullipara, singleton, cephalic, $\geq 37$ weeks, spontaneous labour
2A	Nullipara, singleton, cephalic, $\geq 37$ weeks- Induced labour
2B	Nullipara, singleton, cephalic, $\geq 37$ weeks- Delivered by caesarean section before labour
3	Multipara without previous uterine scar with single cephalic $\geq 37$ weeks in spontaneous labour
4A	Multipara without previous uterine scar with single cephalic $\geq 37$ weeks- Induced
4B	Multipara without previous uterine scar with single cephalic $\geq 37$ weeks- caesarean section before labour
5A	All multipara with one previous uterine scar and single cephalic pregnancy $\geq 37$ weeks- Spontaneous labour
5B	All multipara with one previous uterine scar and single cephalic pregnancy $\geq 37$ weeks- Induced
5C	All multipara with one previous uterine scar and single cephalic pregnancy $\geq 37$ weeks- Caesarean section before labour
6A	All nullipara with singleton, breech pregnancy- Spontaneous labour
6B	All nullipara with singleton, breech pregnancy- Induced labour
6C	All nullipara with singleton, breech pregnancy- Caesarean section before labour
7A	Multipara, singleton, breech pregnancy including women with previous caesarean section- Spontaneous labour
7B	Multipara, singleton, breech pregnancy including women with previous caesarean section-Induced labour
7C	Multipara, singleton, breech pregnancy including women with previous caesarean section-Caesarean section before labour
8A	Multiple pregnancy including women with previous caesarean section- Spontaneous labour
8B	Multiple pregnancy including women with previous caesarean section- Induced labour
8C	Multiple pregnancy including women with previous caesarean section- Caesarean section before labour
9A	Women with singleton pregnancy with transverse or oblique lie including women with previous caesarean section- Spontaneous labour
9B	Women with singleton pregnancy with transverse or oblique lie including women with previous caesarean section- Induced labour
9C	Women with singleton pregnancy with transverse or oblique lie including women with previous caesarean section- Caesarean section before labour
10A	Women with single cephalic pregnancy $\leq 36$ weeks gestation including previous caesarean section- Spontaneous labour
10B	Women with single cephalic pregnancy $\leq 36$ weeks gestation including previous caesarean section- Induced labour
10C	Women with single cephalic pregnancy $\leq 36$ weeks gestation including previous caesarean section- Caesarean section before labour

## RESULTS

During the study period, the total number of women delivered was 1312, out of which by CS were 472. The percentage of CS rate during this specified period was 35.9.

The results of modified Robson's classification were depicted in Table 1. All the cases were divided into 3 group's viz. FF, MF, and LF on the basis of month of delivery during that year. The total number of CS cases in first 4 months (FF) was 161, the middle 4 months (MF) 127 and the last 4 months (LF) was 184. In the present study, all the cases were grouped according to the modified Robson's classification.

The distributions of cases in each group according to classification are depicted in Table 1. An increasing trend was observed in 2B group cases, where as a reducing trend was found in 1 group cases (Table 2).

In addition, the percentage of cases in 4B group increased from 1.24 in FF to 1.63 in LF. An increasing trend was seen in 5C group and the percentage of group 5C cases in FF, MF and LF was 29.8%, 34.64% and 39.13% respectively (Table 2). However, the rate of CS in group 2 (2A+2B) and 5(A+B+C) are unaffected (Table 3).

A decreasing trend was observed in 6C group and the percentage of cases in the three studied groups was 2.48%, 1.57% and 1.08 respectively. Similarly, the reducing trend was also observed in 7C cases. The percentage of cases in 7C was 3.72%, 1.57% and 1.08% in FF, MF and LF respectively (Table 2).

On the contrary, in cases of 1 and 5A groups the trend was found to be decreasing from 27.9, 3.72 in FF to 20.6 and 2.17 in LF respectively (Table 2). No significant changes were noticed in 8, 9 and 10 groups, however decreasing trend was found in 8C cases (Table 2).

**Table 2: Distribution of cases according to modified Robson criteria in each group during the year 2016.**

Group	First 4 months (n=161)	Middle 4 months (n=127)	Last 4 months (n=184)	FF vs MF p-value	MF vs LF p-value	FF vs LF p-value
1	45 (27.9)	33 (25.98)	38 (20.6)	0.35	0.13	0.05*
2A	12 (7.45)	4 (3.14)	8 (4.34)	0.05*	0.29	0.1
2B	22 (13.66)	22 (17.32)	43 (23.3)	0.19	0.09	0.01*
3	00	4 (3.14)	8 (4.34)	0.01*	0.29	0.003*
4A	2 (1.24)	00	2 (1.68)	0.1	0.11	0.44
4B	2 (1.24)	2 (1.57)	3 (1.63)	0.4	0.48	0.38
5A	6 (3.72)	4 (3.14)	4 (2.17)	0.39	0.45	0.19
5B	00	00	00			
5C	48 (29.8)	44 (34.64)	72 (39.13)	0.38	0.21	0.03*
6A	2 (1.24)	4 (3.14)	00			
6B	00	00	00			
6C	4 (2.48)	2 (1.57)	2 (1.08)			-
7A	2 (1.24)	00	00			
7B	2 (1.24)	00	00			
7C	6 (3.72)	2 (1.57)	2 (1.08)			
8A	4 (2.48)	00	00			
8B	00	00	00			
9A	2 (1.24)	00	00			
9B	00	00	00			
9C	00	2 (1.57)	00			
10A	00	00	00			
10B	00	00	00			

FF= First Four months; MF=Middle Four months; LF=Last Four months; p<0.05\* is significant

**Table 3: Comparison of trends in nullipara and previous caesarean section.**

Group	First 4 months (n=161) (34.1%)	Middle 4 months (n=127) (26.9%)	Last 4 months (n=184) (39%)
1	45 (27.9)	33 (25.98)	38 (20.6)
2A	12 (7.45)	4 (3.14)	8 (4.34)
2B	22 (13.66)	22 (17.32)	43 (23.3)
1+2A+2B	79 (49.01)	59 (46.44)	89 (48.24)
5A	6 (3.72)	4 (3.14)	4 (2.17)
5B	00	00	00
5C	48 (29.8)	44 (34.64)	72 (39.13)
5A+5B+5C	54 (33.52)	48 (37.78)	76 (41.3)

## DISCUSSION

It has been evidenced from literature that the importance of Modified Robson TGCS (Ten Group Classification System) in the efforts to reduce the CS rate. In fact, it is well-known that classification of the data of caesarean sections undertaken in any category of obstetric unit becomes a fundamental step towards these efforts. There is a steep increase in the rates of CS in the last three decades globally. A significant percentage of this rise was due to unnecessary operations attributable to non-evidence-based indications, professional convenience, maternal request, and over-medicalisation of childbirth.<sup>19</sup> This is an important issue for health systems in many parts of the world as it causes long and short term health

complications and the increased cost issues associated with caesarean births.

In 2014, ICMR task force study reported by considering 30 teaching medical institutions that the CS rate was found to be 28.1%.<sup>2</sup> And also, according to National Family Health Survey-4 (NFHS-4) the average rate of CS from 2.9% in 1992, has been increased to 17.2% in 2015 ranging from 5.8% in Nagaland to 58% in Telangana.<sup>11</sup> In the present study, the prevalence of CS rate was found to be 35.9% which is almost identical to ICMR task force study.

In the present study, a significant decreasing trend was noticed in group 1 cases particularly when compared

between first four months (FF) and last four months (LF). It could be due to the identification of cases that need CS and posting them for elective CS before labour.

Analysis of our data using modified Robson criteria enables us to target our efforts more specifically and effectively. And also it is very easy for us to know which subgroup of the CS shows the increasing or decreasing trend. A statistically significant increasing trend in group 2B (Table 2), particularly in the last 4 months of studied population (group LF) reveals that more cases of nulliparous women at term with cephalic presentation are undertaken for CS before the onset of labour than the spontaneous labour.

Generally, it is anticipated that the women who delivered vaginally earlier would deliver vaginally in future than the women needing a CS. In the present study, the increasing trend was noticed in 4B group in the last 4 months (group LF) as compared to FF (first 4 months) as well as LF (last 4 months) (Table 2). The data suggests that multigravida even without previous history of CS were also taken for CS before the onset of labour and it might be possible due to lack of efficient nursing staff, non-evidence based indications and also professional convenience.

All nulliparous women were categorised under group 1, 2A and 2B. It was noticed that a decreasing trend in cases of group 1 in the last 4 months (LF) as compared to FF and MF. On the contrary, the increasing trend in the cases of 2B was also found. But, the rate of CS was increased from group 1 to 2B which indicates that more number of nulliparous women was subjected to CS before the onset of labour. However, the rate of CS in nulliparous women (group 1, 2A and 2B) found to be unaffected (Table 3, Figure1). The proclivity of majority obstetricians to take a decision of CS before the onset of labour is to minimize risk of neonatal morbidity and mortality in the progression of labour. This contributes to the increasing trend of primary and repeat CS before the onset of labour.

Similarly, less caesarean section were found in 5A and 5B as compared to 5C group. An increased trend was observed in 5C (Table 2), which signifies the change in the attitude of our obstetricians in favour of CS before the onset of labour rather than after the onset of labour. It is evidence from data, in groups (2A+2B) and (5A+5B+5C), the rate of CS in multiparous women was found to be unaffected although there is a significant change in sub groups (Table 3 and Figure1). It may also be true that more number of CS were also performed in multiparous cases having no history of previous CS for the same reasons. In addition to 2B and 4B, targeting 5C definitely would help our efforts in reducing the CS rate.

In the present study, the total number of cases in group 6 (who are nullipara, singleton with breech pregnancy) was 14, out of which 6 were in 6A and 8 were in 6C where as no cases were in 6B. It was also found that a decreased

trend in 6C cases of LF group as compared to FF and MF groups. This decreasing trend could be possible due to departmental policy as we allow breech pregnancies for assisted breech deliveries in selected cases. Although there is a lot of debate regarding the induction of labour for breech cases, it is a safe practice to avoid induction in breech deliveries.

The cases of twin pregnancy and abnormal presentations were included in group 8 and 9 respectively and we did not find much difference in both these groups. Similarly, in group 10 also no change was found in all preterm cases with cephalic presentation.

The WHO global survey revealed that the most common indications for caesarean section included repeat caesarean delivery (24.2%), cephalo-pelvic disproportion CPD (22.6%), fetal distress (20.5%), breech and other abnormal presentations (12.5%).<sup>20</sup> It has also been observed by an audit from United Kingdom that the top five indications for CS are fetal compromise (22%) followed by failure to progress (20%), repeat CS (14%), breech (11%) and maternal request (7%).<sup>21</sup> Among all, caesarean delivery on maternal request (CDMR) was one of the main indications for CS and has been on a rise (23%), particularly in India as well and is ethically debatable.<sup>22</sup> It is the most frequently cited reason for the increasing incidence of cesarean sections. Undoubtedly, it has been observed in recent years that an increase in mothers request for cesarean delivery on the basis of assumed advantages in the prevention of urinary and fecal incontinence, sexual dysfunction, and genital prolapse etc. compared to vaginal delivery.<sup>23</sup> It has been noticed that relatively the minority of women ask for caesarean delivery, although the high CS rate is often attributed to increase in CDMR. The fear of spontaneous child birth (tocophobia) may also a major contributing factor for the request for elective caesarean section.<sup>24</sup> The incidence of this condition is estimated between 6% and 10%.<sup>24,25</sup> In the present study, the incidence of CS rate was found to be 35.9% during the study period. Among the indications for caesarean delivery, the most common indications in the 1 group were CPD (28%) and fetal distress (22%) whereas in 2A group CPD, fetal distress and failed induction were found to be 12%, 24% and 30% respectively in the study group. Finally, it has been also observed from different cross-sectional studies that the association between CS rates and mortality outcomes of both mother and infant changed from 9% to 16% whereas no association exist above this threshold value.<sup>26</sup>

## CONCLUSION

Auditing the data of CS by modified Robson criteria is the better way of classification to know the changing trends in CS rates. Present study showed increasing trend in group 2B (Nulliparous, singleton, term, vertex, not in labour) and 5C (repeat CS in mothers with previous CS) which needs to be reduced by allowing low risk patients to go into spontaneous labour, trial of scar in singleton

pregnancies and encouraging vaginal birth after caesarean (VBAC) delivery. In addition, providing experienced hands with high quality midwifery, effective utilization of antenatal care and doctor's commitment is some of the effective ways to reduce the increasing CS rates.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Prabhavathi V, Krishnamma B, Prasad DKV, Bhavya K, Satyavathi R. Audit of caesarean deliveries in a tertiary care hospital of northern Andhra Pradesh using modified Robson criteria. *Int J Reprod Contracept Obstet Gynecol* 2018;7:2796-801.