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Original Research Article

Caesarean Section: Rate & Determinants in a Teaching Institute in Eastern U.P, India

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Abstract

Objectives: (1) To evaluate the total caesarean section rate (CSR) along with Primary and repeat caesarean rate. (2) To explore and analyse the indications of caesarean section (CS) along with their sociodemographic and obstetric determinants in our institution to reduce the caesarean section rate in future.

Methods: The present study was conducted retrospectively in the department of Obstetrics and Gynaecology, in a tertiary care institute in eastern UP. Hospital records of women who delivered between January 2016-Dec 2016 were reviewed and information regarding number of caesarean sections performed during the time period, sociodemographic factors, Obstetric characteristics and indication of caesarean section among the pregnant women delivered by caesarean section were noted and analysed.

Results: Out of 3740 deliveries conducted during the study period,1788 were via caesarean section(Total CS rate 47.8%). Primary caesarean section rate was 64.4%. whereas 35.6% were via repeat caesarean section. In our study majority of CS(1568/1788) were performed in emergency (87.7%). In emergency CS group majority (58%)were primary caesareans whereas 29.7% were repeat emergency caesareans. Fetal distress was the main indication (28%) of primary caesareans performed in emergency. Scar tenderness was the main indication(45.8%) for repeat emergency caesareans.

Conclusions: In Present study high caesarean section rate is because of emergency caesarean sections performed in unbooked pregnant women referred from rural areas. Better health care infrastructure in rural areas and thorough evaluation of maternal and fetal conditions during labour can reduce the caesarean section rate and determine the possibility for more vaginal deliveries.

Keywords: Caesarean Section, Caesarean Section Rate, Primary Caesarean, Determinants.

Introduction

Caesarean section is the most commonly performed surgical operation in the world [1]. It is the operative technique by which a fetus is delivered through an incision in the uterus [2]. It is an important lifesaving operation for both mother and child and its use has increased dramatically over the last decade [3]. In 1985 The World Health

Organization has recommended that the population based caesarean section rate should lie between 5-15% [3]. A rate below 5% indicate, a substantial proportion of women have limited access to surgical obstetric care and a rate higher than 15% indicate overuse of the procedure other than life saving reasons [3,4]. Not surprisingly in 2015 WHO issued a new statement, "every effort should be made to provide caesarean sections to women in need rather than striving to achieve a specific rate" [5]. Although the mean world total caesarean section is estimated around 15% as recommended, there are enormous regional differences , for instance 3.5% in Africa and 40.5% in eastern Asia [3]. According to the recent NFHS 4, the average rate of caesarean section in India is17.2% ranging from 5.8% in Nagaland to 58.0% in Telangana [6]. Tertiary care centers have high CS rates but areas where health care facilities were not available may have maternal deaths due to lack of CS facilities [7]

In general, indications for CS have been classified in terms of medical and non-medical reasons. Fetal distress especially by its constant monitoring through electronic systems, breech presentation, abdominal delivery of growth retarded infant, delayed child bearing, increased maternal body mass, placenta previa, prematurity, multiple gestation, previous CS failure to progress for labor pain are some medical indications of CS [8,9]. Rise in incidence of caesarean section could be due to increased safety of the operation due to improved anaesthesia, availability of blood transfusion and antibiotics, other responsible factors such as rising incidence of primary caesarean section, decline in operative vaginal delivery and identification of high risk pregnancy [10]. The Primary caesarean rate has become a major driver in the total caesarean rate [11]. Understanding the factors leading to primary caesarean deliveries is essential to reduce the total caesarean rate [12]. Also the procedure has become an important source of revenue for hospitals and health care providers [13,14,15]. Studies from across the world have shown that the caesarean section rate may be influenced by factors other the ability to pay, including fear of litigation, convenience, perceived safety, fear of substandard care and the opportunity for sterilization [16,17]. High CS rates are of concern because they expose the mother and child to short term and long term health risk18 and impose a financial burden on families and health systems [19]. Recurrent CS, scar rupture, hysterectomy and maternal & fetal death are some of the future risks. Previous CS increases the risk of multiple placental abnormalities like placental abruption, placenta previa and adherent placentation in subsequent pregnancies. [20] We conducted this study to determine the caesarean section rate in our institution and to identify and analyze the sociodemographic factors and indications for caesarean section so that in future we can optimize the caesarean section rate.

Material & Methods

This retrospective study was conducted in the department of obstetrics & gynaecology in B.R.D. Medical college, Gorakhpur, after gaining approval from institutional ethical committee. Initially, data of all women delivered during the study period (January 2016 -December 2016) was collected from Admission register, birth register and labor register. Then women delivered via caesarean sections during the study period were identified and their facility records including admission files & operation theatre registers were reviewed. Sociodemographic parameters like age, economic status, residence (rural/urban), booking status were noted. Type of Caesarean section (Primary/repeat), nature of surgery (emergency/ elective) & obstetric characteristics such as gravida/parity, gestational age at the time of CS were noted.

Total caesarean rate in our institution during the study period(1yr)was calculated

as the number of caesarean birth in a year divided by total number of deliveries in that year. The primary & repeat caesarean rates were also calculated.

The Primary caesarean rate was calculated as the percentage of caesarean deliveries out of all births to women who have not had a previous caesarean delivery.

The repeat caesarean rate was calculated as the percentage of caesarean deliveries out of all births to women who have had at least one previous caesarean delivery.

Indications of CS were collected from case sheets of delivered women and operation theatre registers. Data was expressed in Tables & figures as number and percentage. Total caesareans were grouped into 4 groups- Primary emergency/Repeat emergency & Primary elective/ Repeat elective caesareans. Comparison of indications was done between 4 groups.

Definitions:

Scar tenderness- It is a vague term. It was elicited by pressing below and behind the pubic symphysis in between uterine contractions while engaging the woman in conversation and noting for a visible wince.

Caesarean delivery on maternal request is defined as caesarean delivery performed at the request of the mother in the absence of any medical or obstetric indication.

Results

During the study period total 3740 women were delivered, out of which 1788 (47.8%) women were delivered via caesarean section and 1952 (52.2%) women were delivered via vaginal route (Figure 1).

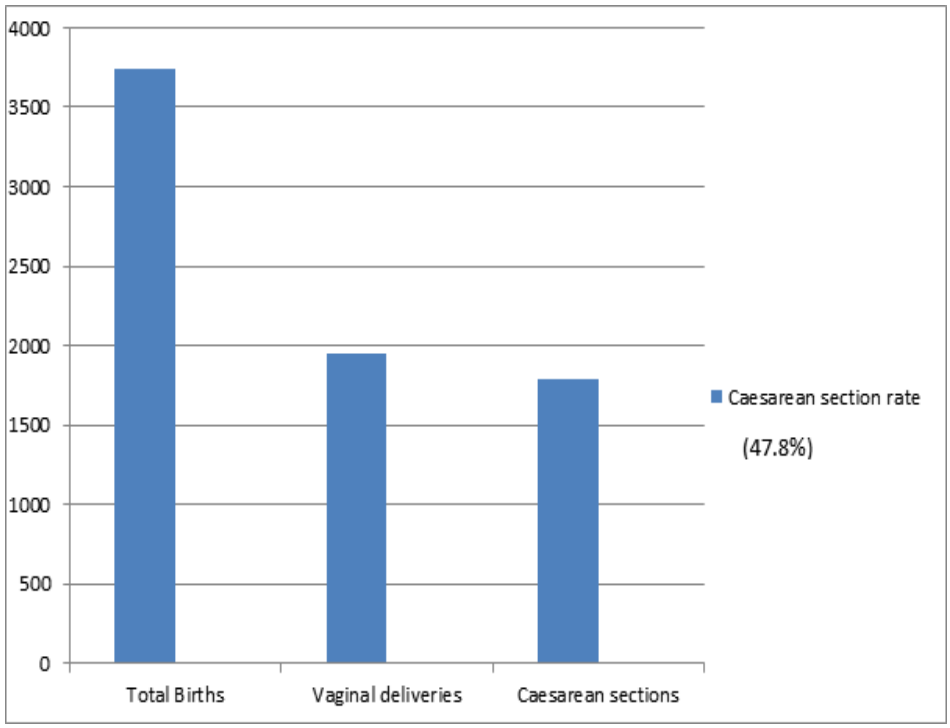

Figure 1:

Maximum number of caesarean (45.3%) were performed in the age group 20-24yrs. 81% women who underwent CS were of low income group. 76.3% women belonged to rural area while only 23.7% women were from urban area. Out of all women in whom caesarean section was performed 76.8% women were unbooked (Table 1).

Table 1: Selected Sociodemographic & Obstetric characteristics seen in women who underwent CS

Characteristics		**No. of cases**	**Percentage**
Age (Years)	<20	6	0.34
	20-29	1442	80.7
	>30	340	19
Economic status		**No. of cases**	**Percentage**
Low-income group (<100,000Rs/yr)		1448	81
Middle income group (100,000-500,000Rs/yr)		268	15
High income group (>500,000 Rs/yr)		72	4
Residence			
Urban		424	23.7
Rural		1364	76.3
Registration status		**No. of cases**	**Percentage**
Booked		415	23.2
Unbooked		1373	76.8
Gravida/Parity			
Nulliparous		710	39.7
Multiparous		1078	60.3
Gestational age			
<37 wks		422	23.6
37 -40 wks		1113	62.3
>40 wks		253	14.1

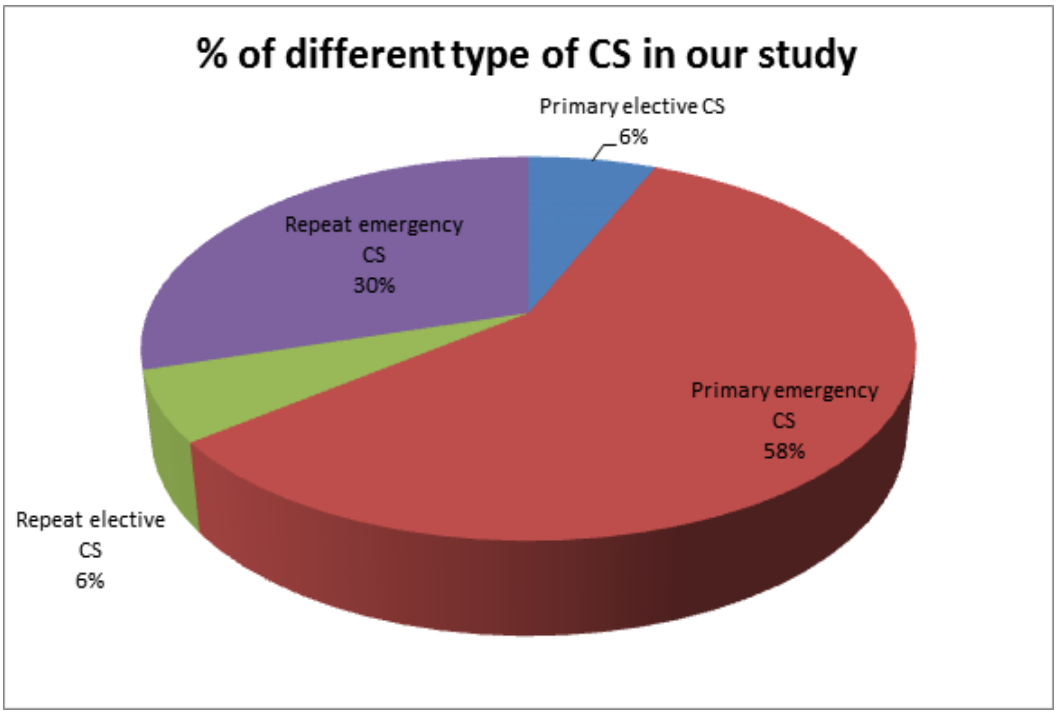

Figure 2:

Total 1568 (88%) women came in emergency in which a large number (87.6%) of women were unbooked & only 12.4% women were booked. In unbooked emergency CS 99.3% were from rural region. Elective caesareans were performed in only 12.3% women and all were booked and belonged to urban region. Out of total

1788 CS, 64.4% were primary caesareans whereas in 35.6% women repeat caesarean section was performed.

Among all women who delivered by caesarean section 39.7% were nulliparous, while 60.3% were multiparous. For gestational age at birth majority of women (62.3%) were term (>37 wks), 23.6% were preterm and only 14.2% were post term (Table 1).

Table 2: Comparison between Indications of Primary emergency and Repeat emergency Caesarean section:

Indications	Primary Emergency		Repeat Emergency	
	No. of cases	Percentage	No. of cases	Percentage
Fetal distress	290	27.97	103	19.40
Non progression of labour	112	10.80	58	10.92
Placenta previa	104	10.03	24	4.52
Malpresentation	105	10.13	14	2.64
Antepartum eclampsia with live fetus	120	11.6	05	0.94
Severe Preeclampsia with live fetus	65	6.27	18	3.39
Obstructed labor	75	7.23	12	2.26
Cephalopelvic disproportion	70	6.75	23	4.33
Contracted pelvis	45	4.34	12	2.26
Maternal request	51	4.9	19	3.6
Scar tenderness	-	-	243	45.8
Total no of emergency cases (Primary +Repeat)	1037	100	531	100

Regarding indications most common indication in primary emergency group (Table 2)was fetal distress (28%) followed by antepartum eclampsia with live fetus (11.6%), (NPOL) Non-progression of labor (10.8%), placenta previa (10%), malpresentation (10%), obstructed labor (7.2%), (CPD) cephalopelvic disproportion(6.8%), Severe preeclampsia with live fetus (6.3%), contracted pelvis (4.3%). In repeat emergency caesarean group majority of CS (45.8%) were performed due to scar tenderness of previous uterine scar followed by fetal distress (19.4%), NPOL (11%), Placenta previa(4.5%), CPD (4.3%), severe preeclampsia with live fetus (3.4%), malpresentation (2.6%), obstructed labor (2.3%)& contracted pelvis (2.3%).

Table 3: Comparison between Indications of Primary Elective & Repeat Elective caesarean section:

Indications	Primary Elective		Repeat Elective	
	No. of cases	Percentage	No. of cases	Percentage
Severe Oligohydramnios with IUGR	38	33.33	31	29.25
Cephalopelvic disproportion	25	21.93	27	25.47
Malpresentation	24	21.05	21	19.81
Contracted Pelvis	17	14.91	14	13.21
Maternal request	10	8.77	13	12.26
Total no of Elective cases (Primary +Repeat)	**114**	**100**	**106**	**100**

In primary elective group (114 cases),Oligohydramnios with growth retarded fetus was the main indication (33.3%) for performing CS,(Table 3) other indications in this group were malpresentation (21.05%), cephalopelvic

disproportion (21.9%) etc. Oligohydramnios with IUGR was the major indication (29.3%) in repeat elective caesarean group same as in primary elective group. Other indications in this group were cephalopelvic disproportion (25.5%), malpresentation(19.8%) & contracted pelvis (13.2%). Maternal request as an indication was mainly seen in repeat elective group (12.3%) followed by primary elective group (8%). 5% women in primary emergency group were those who requested for caesarean operation whereas only 3.6% women in repeat emergency group requested for caesarean section.

Table 5:Comparison of caesarean section rate in our study with other Indian studies during 2015-2016

Study	Place	Year	CSR%
Present study	Gorakhpur, UP	Jan 2016-Dec2016	47.8%
M Gupta et al[21]	Jaipur, Rajasthan	Jan 2016-Dec 2016	32.46%
Jawa A et al[22]	Jaipur, Rajasthan	Dec2015-May 2016	31.80%
Preetkamal et al[23]	Vallah, Amritsar, Punjab	May 2015-April 2016	33.20%
Yadav S et al[24]	Mullana, Ambala, Haryana	April 2015-March 2016	21.60%
Saxena N et al[25]	Dehradoon, Uttarakhand	Jan 2015-Dec. 2015	31.40%
Sarma P et al[26]	Sonitpur, Assam	Jan 2015-Dec. 2015	27.60%

Discussion

In our study the overall caesarean section rate was computed as 47.8%which is higher than the CSR from other states of India except Madras and Telangana [6].The CSR is more than three times the accepted upper norm of World Health Organization of 15% [3]. The high rate of CS in our study is because B.R.D Medical college is the only well-developed institution of eastern Uttar Pradesh (Purvanchal) India, where large number of patients are referred from the Gorakhpur district as well as districts of Bihar and Nepal borders .This high CS rate is an institutional rate in eastern UP and not population rate. According to recent NFHS 4, the average rate of CS in India is 17.2% ranging from 5.8% in Nagaland to 58.0% in Telangana6.The caesarean section rate in our study is comparable to other studies between 2015-2016 [21,22,23,24,25,26, 27]. (Table 4).

In our study maximum women (80.7%) who underwent CS belonged to the age group 20-29yrs which is the age group of maximum fertility. In some Indian studies [22, 26, 28] and in the study conducted in Bangladesh [29], this was the most common age group. A study of Latin American hospital showed maximum incidence of CS in >30yrs in primi patients which might reflect delayed age of marriage in western countries [28, 30]. In some other countries advancing maternal age is an important factor that leads to high CSR.

In our study maximum CS cases were from low income group (81%), belonged to rural area (76.3%) and were unbooked (76.8%).This is because government is now promoting institutional deliveries to prevent maternal and neonatal morbidity and mortality [31]. It is also because government has improved transport system from distant rural areas to help pregnant women to reach the institution in emergency (start of National Ambulance service 102 in 2014 in Uttar Pradesh).

In our study majority of women (60%) who underwent CS were multiparous while 40% were nulliparous. This was similar to studies conducted by Yadav S et al [24] & Bedi K et al [32] (42.40%) in nulliparous women. In present study it was observed that maximum CS (62.3%) were performed in women with term pregnancy and lowest (14.2%) in post term. In preterm women it was 23.6%. Saung Oo et al [33] and Roshdy

et al [34] also found more CS in term pregnancy.

In our study 88% (1568/1788) emergency CS were performed. In women with emergency CS, 88% (1373/1568) were unbooked and most of these unbooked cases belonged to rural area (1364/1373). Only 12.4% (195/1568) women with emergency CS were booked and all were from urban area. Whereas in women with elective CS, all were booked and from urban area. Large number of emergency sections in unbooked women from rural region is because of unawareness and lack of antenatal care in these regions along with preference of labor at home or nearby PHCs or CHCs. Lack of proper antenatal care and lack of categorisation of low risk and high risk pregnancy in these low resource settings is responsible for referral of large number of pregnant women during labor in critical condition. These pregnant women with high risk factors or delivery complications ultimately land in emergency CS to save the mother and/or fetus. This is the vital reason for more emergency CS in our institution. Other Indian studies also reported more emergency CS like Daniel et al [35] in 2014 (54%) & Sarma P et al [26] (84%). The emergency obstetric care provided to the patients is not uniform over the geographical spread. It is different for urban and rural regions and it is even different for different states of India [36].

In this study total primary caesareans were 64.4% whereas 35.6% were repeat CS. On further data analysis out of 1568 emergency cases 66.% were primary CS and only 34% were repeat emergency CS. Out of total 220 elective CS, 51.8% CS were primary CS and 48.2% were repeat caesareans. Zhang et al found that having a prior uterine scar contributed most to the overall caesarean rate, accounting for 30.9% of all caesarean deliveries [11]. Barber et al found that 50% of the increase in caesarean deliveries at their institution was attributed to an increase in primary caesarean deliveries [37].Understanding the factors leading to primary caesarean deliveries is essential to reduce the total CSR.

In our study fetal distress (non-reassuring FHR tracing) was the commonest indication (28%) in primary emergency CS group and second commonest (19.4%) in repeat emergency CS group. This is similar to studies conducted by Barber EL et al [37] and Liu S et al [38]. However continuous electronic fetal monitoring (EFM) in the labour ward, together with fetal scalp capillary PH measurements when necessary have been shown to more accurately diagnose fetal distress and to reduce unnecessary CS [39] when compared to EFM alone. Fetal distress has a reported global prevalence of about 20% [40].

Scar tenderness was the most common indication (45.8%) in repeat emergency CS group. Although scar tenderness is a vague term, to avoid the most catastrophic complication i.e. uterine rupture in these unbooked women with previous caesarean section, prompt action in the form of caesarean section was taken. In a study done by Khalil S et al [41] uterine scar tenderness was found to be a useful predictor of complications in a trial of scar. To reduce repeat CS because of this indication we must judiciously select the women for primary CS.

Antepartum eclampsia with live fetus was the 2nd commonest(11.6%) indication in primary emergency group whereas only 0.9%(5/531) CS were performed in repeat emergency group with this indication. Large no of eclampsia cases are referred from PHCs and CHCs to our institute in emergency hours. In pregnant eclamptic women with live fetus with poor Bishop score, Caesarean section was performed after stabilisation of condition.

Nonprogress of labour or failure to progress was seen as an indication in 10.8% of primary emergency and 11% of repeat emergency CS cases. Boyle et al in their study conducted in 2014 concluded that waiting longer for labor to progress and

using 6 cm as the cutoff for active labor could have a major effect on decreasing the primary caesarean rate [12],They also concluded that conservatively managing the second stage of labor, by allowing adequate time and encouraging operative vaginal delivery, when appropriate , may also have a major effect on decreasing the primary caesarean rate [12].

Placenta previa with active bleeding was present in10% of primary emergency CS group and 4.5% of repeat emergency CS group. There was no possibility for conducting vaginal delivery. Immediate action in the form of CS was taken along with blood transfusion.

Obstructed labour was found as indication in 7.2% cases in primary emergency CS group whereas 2.3% cases belonged to repeat emergency group. Pregnant women with obstructed labour were referred from distant rural areas after trial of labor by dais under unhygienic conditions which further increased the morbidity of patients.

Severe oligohydramnios with IUGR was the most common indication in elective CS group. It was found in 33.3% cases in primary elective group and 29.3% in repeat elective group. These women were not in labour and were with poor Bishop score, so to avoid cord compression and fetal compromise they were operated via CS electively.

Cephalopelvic disproportion was found as second most common indication in primary and repeat elective CS group (21.9% & 25.5%). Whereas it was found in only 6.8%in primary emergency group and 4.2% in repeat emergency CS group. The high proportion of caesarean section for cephalopelvic disproportion diagnosed before the onset of labour suggest a more aggressive approach, thus causing an increase in caesarean section rate [42].

Severe preeclampsia with live fetus was indication in 6.3% cases of primary emergency CS group and only 3.4% in repeat emergency CS group. Because of poor Bishop Score these women were taken directly for caesarean without inducing labour after giving antihypertensive, anticonvulsant therapy.

Another important indication in elective CS group was fetal malpresentation. It was found in 21% women of primary elective CS group and 19.8% in repeat elective CS group. In primary emergency CS it was found in 10.1% cases and only 2.1% in repeat emergency CS. The American college of Obstetrician and Gynaecologists advocates offering external cephalic version (ECV) to patients with fetal malpresentation [43]. ECV can be tried with proper precaution, but planned caesarean is found to have lesser complication rate [44, 45, 46].

Moderate to severely Contracted pelvis was the indication in 15% women of primary elective CS group and 13.2% of repeat elective CS group. This was due to short stature of women in this region due to genetic or nutritional causes. However this was responsible for only 4.3% in primary emergency CS and 2.3% in repeat emergency CS group. [47]

Maternal request as indication in elective CS group was responsible for 12.3% in repeat elective CS and 8.8% in primary elective CS. The contribution of maternal request caesarean to the overall caesarean rate has recently received much attention. [36] All women in whom elective CS were performed belonged to urban area & were booked. In primary elective CS the main cause for maternal request was fear of long painful labours whereas in repeat elective CS women were more conscious about complications following VBAC so they didn't give consent for VBAC and prefer elective CS. In emergency CS group few women who were in labour and were without any indication of CS also requested for CS (4.9% in primary emergency CS and 3.6% in repeat emergency CS) due to fear of fetal demise & scar dehiscence.

Conclusion

In present study the CS rate is quiet high and it was mainly due to primary caesarean sections performed in emergency. Maximum pregnant women were unbooked, referred from nearby rural areas in emergency and fetal distress was the main indication in these cases. They usually came with malnutrition, anaemia, infection and other high risk conditions. These women should get proper antenatal and intranatal care in institutional set up to reduce the number of primary emergency CS. Reduction in rate of Primary CS will automatically reduce the repeat CS .In repeat caesarean cases also standard antenatal care has important role in selecting cases for VBAC.

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Declaration

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