

Original Article**Exploring the incidence and causes of cesarean Delivery : Partially Mixed Concurrent quantitative and Qualitative analysis from a Medical College**Ayesha Ahmad¹, Fareha Khatoon², Suman Nishad³, Saambhavi⁴, Sonali Sonam⁵**Abstract**

Background: India has seen a rise in the incidence of cesarean deliveries (CD) especially in the last decade. The present national average stands at 17.2%, which if taken as a stand alone figure represents an almost ideal statistical measurement. However, the country has widespread regional variations in the CD rate, ranging from 4.4% to 35.9%. Auditing individual CD rates by each institution, and exploring reasons for high incidence remains an essential component of maternal care. **Aim of the study:** The present study was done to find out the incidence of CD at our facility, compare it with the national average and explore reasons for high incidence of CD. **Methodology:** It is a partially mixed concurrent quantitative and qualitative study including retrospective analysis of one year data and filling up of questionnaire from resident doctors. Data extraction was done from Maternity Ward, for all women who delivered during the aforementioned period in our facility, including socio-demographic profile, number of births, mode of delivery, reasons for induction of labour and any complications during childbirth. Statistical analysis was done using appropriate tests. **Results:** A total of 621 deliveries were studied, out of which 44.6% delivered vaginally and 55.3% had CD. **Conclusion:** The incidence of CD in the present study is 55.3% . The main reasons for high incidence of CD are high risk pregnancies, previous CD, fear of litigation and logistical delays in performing Category I cesarean section, prompting early decision for CD.

Keywords: Cesarean Delivery; Vaginal delivery; Incidence of Cesarean section; Maternal morbidity

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Introduction

Cesarean Delivery (CD) rate has seen an exponential rise in India in the last decade with the present national average standing at 17.2%¹. These numbers can be misleading because of the regional variations observed with differing rates in urban/ rural sectors,

public/ private facilities, tribal and non tribal areas etc. In 1985, at the convention in Fortaleza, Brazil World Health Organisation (WHO)² declared that a CD rate higher than 10-15% was unjustifiable in any circumstance. Further, it emphasised a CD rate of 5 to 15% as a measure of optimum maternity

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care. A lesser rate indicated inadequacy of obstetric care whereas a higher rate implied unnecessary and probably non-indicated management of pregnancies. Recently WHO retracted the earlier statement, emphasising that although they do not recommend a specific rate of CD any longer, extremely high or low CD is an important indicator of quality of maternity services of a hospital or a country³.

The present study was done as part of our policy to audit the maternity services by finding out the incidence of CD at our facility and comparing it with the national average. As a secondary outcome measure, we wanted to explore the reasons for high incidence of CD by critical analysis of data as well as by interviewing the primary care providers which included post-graduate students and senior residents.

Methodology

Design, Setting and Participants:

The present study is a partially mixed concurrent quantitative and qualitative study. Retrospective analysis of data was conducted at Era's Lucknow Medical College and Hospital, Lucknow (ELMCH) from January 2019 to December 2019. It is a private Medical College that is situated at the outskirts of Lucknow city and has a mixed patient profile, catering to people from middle and lower socio-economic strata of society. The study was approved by the institutional ethical committee. Data extraction was done from Maternity Ward for all women who delivered after 34 weeks of gestation, during the aforementioned period in our facility, including socio-demographic profile, number of births, mode of delivery, reasons for induction of labour and any complications during childbirth. Women who delivered at less than 34 completed weeks of gestation were not included for the purpose of our study. Primigravida was defined as a woman pregnant for the first time. Multigravida was defined as a woman pregnant for ≥ 1 time before the present study. CD was divided in four categories: I - IV as per the NICE guidance⁴. The subjects were divided in two groups depending on whether they had a vaginal delivery (Group II) or CD (Group I). Anonymisation was ensured for the socio-demographic data.

As part of assessment from resident doctors

regarding rising trend of CD and the actual on-floor problems faced by them, the investigators designed and validated a questionnaire consisting of both open- and close-ended questions. The residents were invited to participate in the study and were recruited after prior informed consent and assurance of anonymity. 21 in depth qualitative interviews were conducted and questionnaire completed.

Main outcomes and measures:

The CD rate was calculated as the number of CD divided by total births. Each CD were categorised according to Robson's classification⁵ and studied for indication, maternal and perinatal outcome and any intra-partum or postpartum complications for the first 48 hours after CD. The rate for each indication was calculated annually as the number of CD performed for each indication per 100 CD.

The results were evaluated in terms of percentage. Statistical analysis was done using Chi square test and calculation of p value. A p value of <0.05 was considered as significant.

For the qualitative samples, the questionnaires were coded manually using a coding frame that we developed from the concepts that emerged in the data and taken from existing literature. A list of key themes and sub-themes were drawn up and conclusions drawn.

Ethical issues: The information about patients, their socio-demographic profile was kept strictly confidential.

Results

A total of 621 deliveries were studied, out of which 44.6% delivered vaginally and 55.3% had CD. Table 1 gives the socio-demographic characteristics of the patients recruited for the study. The mean age of subjects was similar in the two groups ($\chi^2=6.74$; $p=0.150$). Majority of women were multigravidas (66.1%) and ≥ 37 weeks gestation of pregnancy (85.4%). 107 women (17.23%) had prior CD. In this group, 30% women had more than previous one cesarean. The overall rate of vaginal birth after cesarean (VBAC) was 9.3%. Repeat CD for women with previous one cesarean and $>$ previous one cesarean being 62.6% and 96.77% respectively.

Table 1: Socio-demographic Profile of Enrolled Patients

Characteristic	Group I (CD);n(%)	Group II (VD);n(%)	Statistics
Age			
<=19 years	11(3.19)	8(2.89)	$\chi^2=6.74; p=0.150$
20-25 years	161(48.26)	118(42.60)	
26-30 years	143(41.56)	112(40.43)	
31-35 years	20(5.81)	32(11.55)	
>35 years	9(2.62)	7(2.53)	
Parity			
Primigravida	113(32.8)	98(35.4)	$\chi^2=0.438; p=0.508$
Multigravida	231(67.2)	179(64.6)	
Antenatal Status			
Booked	207(60.2)	151 (54.5)	$\chi^2=2.01; p=0.156$
Unbooked	137(39.8)	126 (45.5)	
Residence			
Urban	218 (63.4)	157 (56.7)	$\chi^2=2.87; p=0.090$
Rural	126 (36.6)	120 (43.3)	
Literacy status			
Illiterate	36 (10.5)	34 (12.3)	$\chi^2=1.19; p=0.946$
Class 6	43 (12.5)	32 (11.6)	
Class 7 -10	72 (20.9)	52 (18.8)	
Class 11-12	136 (39.5)	109 (39.4)	
Graduate	42 (12.2)	38 (13.7)	
Post graduate	15 (4.4)	12 (4.3)	
Socioeconomic status (Kuppuswamy)			
Upper class	10 (2.9)	10 (3.6)	$\chi^2=0.563; p=0.905$
Upper middle	108 (31.4)	92 (33.2)	
Lower middle	160 (46.5)	125 (45.1)	
Upper lower	66 (19.2)	50 (18.1)	
Lower middle	0	0	

Most of the CD were Category I CD (81.4%). We have used the Robson system of classification of CD as a standard method for analysis. (Table 2). Overall maximum CD rate was contributed by group 5 of Modified Robson's criteria. (Previous CD, singleton cephalic, >37 weeks gestation, before onset of labour).

Table 2: CD Indication According to Modified Robson's Criteria

No.	Group	N	%
1	Nulliparous, singleton cephalic >37 weeks in spontaneous labour	52	15.11%
2	Nulliparous, singleton cephalic, >37 weeks, induced or CD before labour		
	• Induced	16	4.65%
	• CD before labour	42	12.20%
3	Multiparous (excluding previous CD), singleton cephalic, >37 weeks in spontaneous labour	26	7.55%
4	Multiparous (excluding previous CD), singleton cephalic, >37 weeks, induced or CD before labour		
	• Induced	7	2.03%
	• CD before labour	30	8.72%
5	Previous CD, singleton cephalic, >37 weeks		
	• Spontaneous	38	11.04%
	• Induced	1	0.29%
	• CD before labour	58	16.86%
6	All nulliparous breeches		
	• Spontaneous	7	2.034%
	• Induced	0	0%
	• CD before labour	5	1.45%
7	All multiparous breeches (including previous CD)		
	• Spontaneous	5	1.45%
	• Induced	0	0
	• CD before labour	3	0.87%
8	All multiple pregnancies (including previous CD)		
	• Spontaneous	1	0.29%
	• Induced	0	0%
	• CD before labour	3	0.87%
9	All abnormal lies (including previous CD), excluding breech		
	• Spontaneous	0	0%
	• Induced	0	0%
	• CD before labour	0	0%
10	All single cephalic, <36 weeks (including previous CD)		
	• Spontaneous	22	6.39%
	• Induced	1	0.29%
	CD before labour	27	7.84%

Table 3 gives determinants of mode of delivery. Significant association was found with chronic medical disorders and incidence of CD.

Table 3: Determinants of Mode of Delivery

		Group I (CD);n(%)	Group II (VD);n(%)	Statistics
Period of gestation				
	34-37 weeks	92(26.7)	65(23.4)	$\chi^2=0.873$ p=0.350
	>37 weeks	252(73.2)	212(76.5)	
N		344	277	
Previous CD				
	No previous CD	247(71.8)	267(96.4)	$\chi^2=65.7$; p<0.001
	1 CD	67(19.4)	9(3.2)	
	2 CD	26(7.5)	1(0.4)	
	>/=3 CD	4(1.2)	0	
Weight of baby				
	<3rd centile	11(3.2)	15(5.4)	$\chi^2=6.25$; p=0.100
	3rd to <5th centile	85(24.7)	52(18.8)	
	5th to 95th centile	246(71.5)	210(75.8)	
	>95th to 97th centile	2(0.6)	0	
Breech presentation				
	Primigravida	5(1.5)	1(0.4)	$\chi^2=0.055$; p=0.815
	Multigravida	15(51.6)	4(1.4)	
Chronic medical disorders				
	Chronic hypertension	6(1.7)	1(0.4)	$\chi^2=2.63$; p=0.105
	Thyroid disease	49(14.2)	17(6.2)	$\chi^2=10.6$; p=0.001
	Pre-gestational DM	9(2.6)	0	$\chi^2=7.35$; p=0.007
	Rheumatic Heart disease	3(0.9)	0	$\chi^2=2.43$; p=0.119
	Chronic Liver disease	2(0.6)	1(0.4)	$\chi^2=1.62$; p=0.204
	Women with Chronic Medical Disorders	69(20.1)	19(6.9)	
Antenatal complications				
	Pregnancy induced hypertension	45(13.1)	27(9.7)	
	Antepartum haemorrhage	20(5.8)	2(0.7)	
	Gestational DM	15(4.4)	8(2.9)	
	Women with Antenatal Complications	80(23.3)	37(13.4)	

Table 4 tabulates the complications observed with CD in the present study. Infective sequelae such as minor wound infection, post partum fever and wound gape were the commonest complications. Qualitative Responses of resident doctors are shown in Table 5.

Table 4: Complications observed with CD in the present study

Complication	Number (n)	Percentage of total CD (%)
Post partumhaemorrhage	6	1.74
Bladder injury	0	0
Bowel injury	0	0
Wound gape	11	3.20
Urinary tract infection	6	1.74
Wound infection (minor)	34	9.88
Post operative fever	13	3.77
Anaesthetic complications	3	0.87
Total no. of complications	63	18.31

Table 5: Reason for high CD: Responses of Resident Doctors

1	Fear of litigation; early decision for CD
2	Non availability of obstetric analgesia, especially in women with previous CD
3	High risk pregnancies
4	Fear of pain of childbirth, especially in women with previous CD
5	Lack of invasive fetal monitoring
6	Commercial interests
7	Lack of support to patient during labour due to restrictive policy of not allowing any companion in labour room
8	Logistical Delays in performing Category I CD, prompting early decision for CD

Discussion

CD have seen an exponential growth in India in the past ten years. With figures estimating a 300% increase in incidence⁶, CD is attaining the worrisome proportions of an epidemic. Indian government statistics show an increase of CD in public hospitals, from 6% of total births in 2008-09 to 14% in 2018-19⁷. The incidence of CD in private hospitals is much higher.⁸

The total CD rate at our institution is 55.3% which is high and is in concordance with the findings observed by NFHS-4 for the city of Lucknow⁹. Despite the fact that there are no financial remunerations at stake at our Medical College, we find that the CD trend is similar to other private institutions. One of the reasons could be the population demographics and categorisation of cases being practiced in the area, with complicated ones being referred to Medical Colleges. As a result, we find obstetric

patients with multiple medical problems and increasing complexity being referred to our institute. Nigar et al¹⁰ conducted a similar study in Lucknow and found CD rate of 36.39%. They cited a high incidence of referrals as being one of the major factors contributing to CD. We found maternal thyroid disorders, pre-gestational DM and antepartum haemorrhage to be significantly associated with a higher incidence of CD.

UP is amongst the 9 states in India with average CD rates lower than 10%. However, the selfsame states are the highest contributor to maternal and child mortality. Therefore, the lower incidence might actually be a reflection of poor accessibility of essential obstetric care including facilities for indicated CD. The widespread geographic variations in CD in India have been observed to coincide with under- and over-served regions, lending credence to the hypothesis that this reflects an unmet need for essential obstetric care.^{11,12}

Women with previous CD constitute 17.23% of the study group. 30% of these women had more than one previous CD. Not only is this a reflection of the increasing number of women with a CD, this is an important contributory factor for rising CD. We found that history of previous CD is significantly associated with CD in the index pregnancy. A large majority of subjects in our analysis did not give consent for trial of labour after cesarean (TOLAC). Although we could not assess the reasons for this trend as ours was a retrospective study, other investigators have dealt with this aspect in detail. Fear of pain of childbirth and refusal to undertake any risks such as risk of rupture with TOLAC have been cited as two important reasons.¹²

Information derived from the questionnaire filled by post graduate trainees pertained to the on-site reasons for tilting of obstetric practice towards CD vis-a-vis vaginal delivery (VD). An important reason that emerged was logistical delay in performing Category I CD and resultant adverse perinatal outcome. Due to these concerns, early decision for CD is the norm as opposed to further trial of labor in spite of latter

being a legitimate obstetric approach. Gupta et al¹³ found several causes of delay such as obtaining consent, sending investigations, arranging for blood products, non availability of theatre, lack of ancillary staff etc. This needs to be analysed in detail and improvement of processes to be done in order to smoothen the transition of patients from labour ward to theatre.

Limited labour analgesia and fear of pain of VD was a predominant feature especially in primigravidae and in women with previous CD. Aksoy et al¹⁴ and Stoll et al¹⁵ observed that fear of labour pain was a major cause behind maternal requests for elective CD. In the context of resource limited settings, provision of epidural analgesia remains restricted. However, other methods of pain relief need to be worked out, including antenatal preparation by conducting education and training sessions for patients and their families. Stoll et al¹⁵ stated that routine introduction of young women to the relative merits and demerits of VD, CD and routine usage of technological and pharmacological interventions will help in empowering them in making the correct decisions during pregnancy and labour.

Limitations of the Study

Due to the retrospective nature of the present study, there were many aspects that we could not evaluate especially perceptions of patients towards labour and delivery, information about CD and support available during labour. e.g presence of birth companion.

Conclusion

- The incidence of CD in the present study is 55.3 %.
- There is a significant association of maternal thyroid disorders, pre-gestational DM, antepartum haemorrhage and prior history of CD with a higher incidence of CD.
- The main reasons for high incidence of CD are high risk pregnancies, previous CD, fear of litigation and logistical delays in performing Category I cesarean section, prompting early decision for CD.

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Justification for Authorship:

AA conceived the project and wrote manuscript, FK defined intellectual content and literature search, SN did data acquisition and analysis, S and SS helped in statistical analysis. All the authors reviewed the final manuscript.

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