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Research Article

A one year study on evaluation of pattern of caesarean section and its outcome before and after introduction of Janani Suraksha Yojna and maternal ambulances services

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ABSTRACT

Background: The steady rise in caesarean section rates is an emerging area of concern in mother-child healthcare and a matter of international attention. During last decade Janani Suraksha Program and maternal ambulances services have brought many significant changes in maternal and perinatal outcomes in India, one of which is significantly increased number of institutional deliveries, this may have brought a difference in pattern of cesarean sections as well. Present study has analyzed caesarean section trend before and after introduction of Janani Suraksha Yojna (JSY) and maternal ambulance services at our institute.

Methods: A structured proforma was filled up for every case and results were recorded on excel sheet. All the cases included in study were further divided in group 1 (deliveries done in year 2004-2005), group 2 (deliveries done in year 2014-2015) before and after introduction of JSY and maternal ambulance services respectively. Comparative analysis between study group1 and group 2 was done using Pearson Chi square test.

Results: In group1, total deliveries during study period were 6050, out of which 562 (9.28%) were caesarean deliveries. In group 2, total deliveries was 8674, out of which 1182(13.62%) were caesarean deliveries. The most common indication for which the rise in caesarean section rate is seen in our study was repeat caesarean section, in group 1 was 21.7% and in group 2 was 32.2%, followed by failed medical induction.

Conclusions: The rate of caesarean section has increased after introduction of JSY and maternal ambulance services which may be a direct consequence of increase in institutional deliveries.

Keywords: JSY, Maternal ambulance services, Caesarean section incidence

INTRODUCTION

Caesarean section is the oldest of operations in surgery and was mainly meant to save the mother when a vaginal delivery was not possible even after a destructive procedure. One of the most controversial features of modern obstetric practice is the dramatic increase in the incidence of caesarean section. Data suggest at least a threefold increase from less than 5% to more than 15% in the course of a single decade with a persistent upward trend. With increasing safe methods of anaesthesia,

advent of antibiotics, blood transfusion facilities, use of lower segment incision, better understanding of fluid and electrolyte balance during labor and better surgical techniques, the indications for caesarean section are liberalized both in the interest of mother and fetus.

The steadily increasing global rate of caesarean section have become one of the most debated topics in maternity care as its prevalence has increased alarmingly in the last few years.^{1,2} Caesarean section rate in USA is 29.1%, England 21.5%.^{3,4}

There is no consensus about what the ideal caesarean section rate should be, however WHO states that no additional health benefits are associated with a caesarean section rate above 15%.⁵ However critical evaluation of the attitude towards the liberalization of the indications is needed. There is also need to explore alternative strategies which can help to achieve vaginal deliveries without unduly jeopardizing maternal and fetal well-being. Leitch stated that indications for caesarean section should be the focus of study that leads to increased caesarean section rate.⁶

In a developing country like India there is an increasing trend of C-section delivery with increase in the institutional deliveries and growing access to gynaecological and obstetric care. A study by Indian Council of Medical Research (ICMR) in 33 tertiary care institutions noted that the average caesarean section rate increased from 21.8 percent in 1993-1994 to 25.4 percent in 1998-1997. Studies also suggest that one of the important factors behind performance of C-section could be high education background of women, more presence of private hospitals or sometime interplay between doctors' motivation and financial incentives of the hospitals behind such trend.

Caesarean section like most other invasive procedures is principally intended to improve medical outcome. Because pregnancy outcomes relate to both mother and fetus, caesarean section can improve either maternal or fetal outcome or both. Caesarean delivery has many possible immediate untoward consequences too. There can be an increased risk for postpartum infectious morbidity despite antibiotic prophylaxis, an increased risk of significant blood loss and blood products replacement and an increased risk of anaesthetic complications. If proper decision is taken to select the cases for caesarean section, the number of primary sections could be brought down, as post caesarean pregnancies are high risk cases and need close supervision, scrupulous care evaluation.

During last decade Janani Suraksha Program and maternal ambulances services have brought many significant changes in maternal and perinatal outcomes in India, one of which is significantly increased number of institutional deliveries, this may have brought a difference in pattern of caesarean sections as well, analysis of which has not been incorporated in much of the studies.

Present study has been conducted in department of obstetrics and gynaecology, Shyam Shah Medical College, Rewa, MP, India to analyse the difference in pattern of caesarean sections before and after introduction of JSY and Maternal ambulances services over a period of one year.

METHODS

The present study entitled "a one year study on evaluation of pattern of caesarean section and its outcome before and after introduction of JSY and maternal ambulance services" was conducted in the department of obstetrics and gynaecology, Shyam Shah Medical College and Associated Gandhi Memorial Hospital, Rewa, Madhya Pradesh, India.

GMH is a government teaching institution which serves as a tertiary referral centre for a huge area including the districts Rewa, Sidhi, Singrouli and Satna. A team of obstetricians, anesthesiologists and neonatologists is available round the clock for managing emergencies. The hospital is equipped with operation theatres, blood bank and obstetrics and neonatal ICU.

Methodology

Data collection and analysis: A structured proforma was filled up for every case and results were recorded on excel sheet, which included information on age, gravidity, literacy, area of residence, type of antenatal care received, referral status, type of delivery, indication of LSCS, complication of LSCS, Neonatal outcome. Number of deliveries, total number of LSCS, grouping of indication of LSCS, TGCS groups, total admissions, live births, JSY beneficiaries, total neonatal admissions & neonatal deaths were all recorded from departmental statistics records. All the cases included in study were further divided in group 1 and group 2 as following:

- Group 1: all the caesarean deliveries done in year 2004-2005.

(One year before the introduction of JSY and maternal ambulance services).

- Group 2: All the caesarean deliveries done in year 2014-2015.

After ten year of introduction of JSY and ambulances services when these services are well established.

Inclusion criteria

All the cases of caesarean delivery during study time were included.

Exclusion criteria

Clinically diagnosed cases of ruptured uterus and proven on laparotomy.

Statistical analysis

Comparative analysis between study group1 and group 2 was done using Pearson Chi square test. Differences with

p values of less or equal to 0.05 was considered statistically significant.

RESULTS

As shown in Table 1, in group 1, total number of deliveries during the study period was 6050, out of which 562 (9.28%) was caesarean deliveries. In group 2 total number of deliveries during study period was 8674, out of which 1182 (13.62%) were caesarean deliveries. There is significant increase in total number of deliveries ($P<0.001$) and in caesarean section rate ($P<0.001$) between group 1 and 2.

Table 1: Incidence of total deliveries and caesarean section.

Group	Total deliveries	Total caesarean	Percentage
1	6050	562	9.28%
2	8674	1182	13.62%

Table 2: Distribution of cases according to age.

Group	<18 years		18-35 years		>35 years		Total
	No	%	No	%	No	%	
1	90	16.01%	466	82.9%	12	1.07%	562
2	02	0.16%	1168	98.8%	12	1.01%	1182

As evident from Table 2, in group 1, out of 562; 90 (16.01%) cases were less than 18 year of age, while in group 2 out of 1182; 2 (0.16%) cases were less than 18 year of age. Total number of cases in less than 18 year of age decreased significantly ($P<0.001$) over 10 years. There is no significant change in distribution of cases in age group of 18-35 year and >35 year.

Table 3: Distribution of cases according to parity.

Group	Nullipara		Multipara		Total
	No	%	No	%	
1	293	52.14%	269	47.86%	562
2	596	50.40%	586	49.5%	1182

Table 3 compares parity between two groups, in group1, among 562 patients, 293 (52.14%) were nulliparous while 269 (47.86%) were multiparous. In group2, among 1182 patients 596 (50.40%) were nulliparous while 586 (49.5%) were multiparous. There is no significant change in parity between group 1 and group 2.

It is evident from Figure 1 that in group 1, among 562 patients, 348 (61.92%) belonged to rural area while only 214 (38.0%) were from urban area. In group2, among 1182 patients, 933 (78.9%) belonged to rural population while only 249 (21.06%) were from urban population. There is significant increase ($P<0.001$) between the group1 and group2, regarding females coming from rural

areas, indicating the positive effect of JSY and ambulances services in providing antenatal care to rural population.

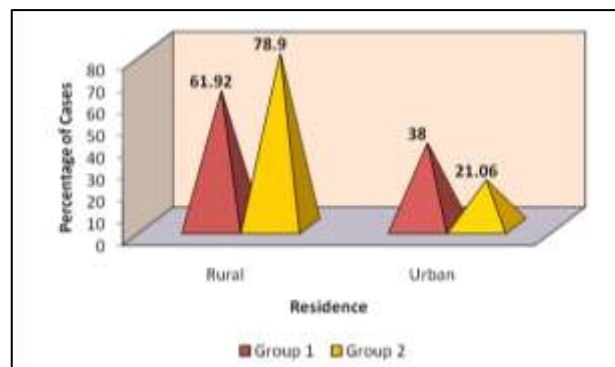


Figure 1: Distribution of cases according to residence.

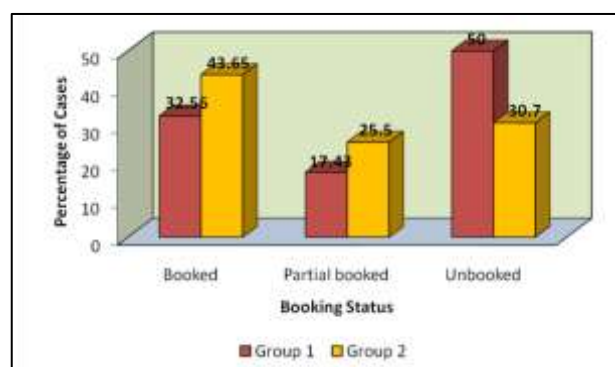


Figure 2: Distribution of cases according to booking status.

In group1, out of 562 patients 183 (32.56%) were booked, 98 (17.43%) were partially booked, 281(50%) were unbooked. In group 2, among 1182 patients 516 (43.65%) were booked, 302 (25.5%) were partially booked, 364 (30.7%) were unbooked (Figure 2). There is significant difference in booking status between group1 and 2 ($p<0.001$).

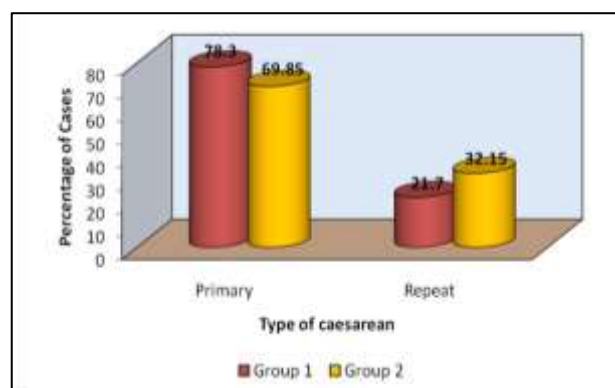


Figure 3: Distribution of cases according to type of caesarean.

Figure 3 suggests that in group1, primary caesarean sections done were 440 (78.3%) cases and repeat caesarean sections were 122 (21.7%) cases. In group2 out of 1182 cases, 802 (69.85%) were primary caesarean and 380 (32.15%) were repeat caesarean section. There is significant increase in rate of repeat caesarean sections ($p<0.001$).

As it is evident from Figure 4 that in the group1, study fetal distress was the most common indication i.e.192 (34.1%) cases followed by previous section 122 (21.5%), CPD 121 (21.5%), Breech 64 (11.3%), PIH+pre-eclampsia 63 (11.03%), PROM 49 (8%), NPOL 29 (5.16%), POP+DTA 29 (5.16%). Malpresentation other than breech was 69 (12.27%). While in group 2, previous section was the most common indication i.e. 380 (32.15%) cases followed by fetal distress 329 (27.85%), CPD 163 (13.79%), failed induction 126 (10.65%), PIH+pre-eclampsia 99 (8.38), breech 98 (8.29%), NPOL 70 (5.92%), oligohydramnios 60 (5.08%), PROM 54 (4.57%). Malpresentation other than breech were 103 (8.71%).

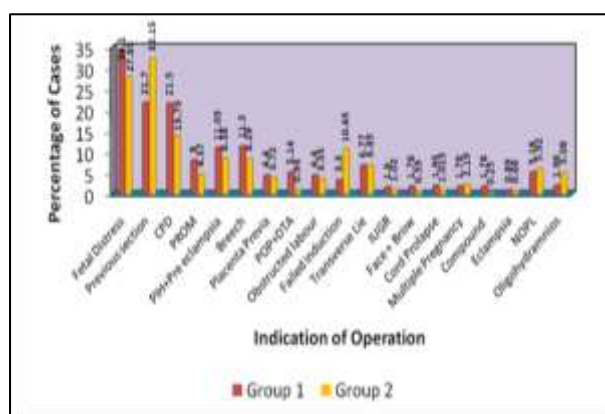


Figure 4: Distribution of cases according to indication of caesarean.

It is clear from Figure 4 that there is significant difference in distribution of cases among some indications between group 1 and group 2, previous section ($P<0.0008$), Failed medical induction ($P<0.0001$), CPD ($P<0.0008$), Foetal distress ($P<0.02$), POP+DTA ($P<0.0001$), PROM ($P<0.0017$), oligohydramnios ($p<0.0025$).

In group 1 atonic PPH occurred intra-operatively in 31 (5.5%) of cases, extension of uterine incision occurred in 21 (3.7%) of cases, adhesion was present in 30 (5.3%) of cases. Bladder injury occurred in 1 (0.18%) case. Blood transfusion was done in 6 (1.07%) of cases. Anaesthetic complications occurred in 11 (1.18%) of cases. Cardiac arrest occurred in 1 (0.17%) case. In group 2 atonic PPH occurred intra-operatively in 23 (1.95%) of cases. Extension of uterine incision occurred in 13 (1.09%) of cases. Previous adhesion found in 77 (6.51%) of cases. Blood transfusion was done in 17 (1.43%) of cases. Anaesthetic complication occurred in 34 (2.88%) of cases (Figure 5).

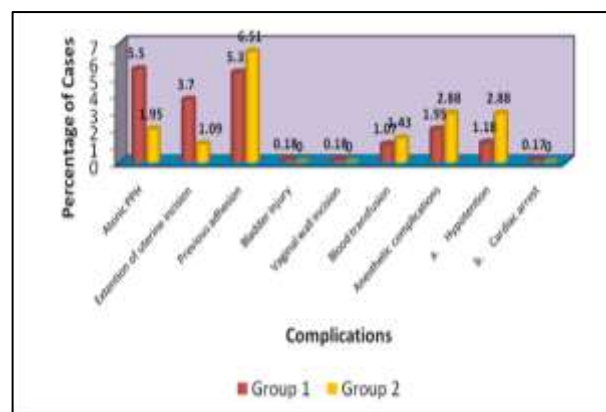


Figure 5: Distribution of per-operative complications across both the groups.

It is evident from Figure 6 that in group 1, postoperative wound sepsis seen in 79 (14.05%) of cases, of which in 11 (1.95%) of cases restoring done. Febrile morbidity occurred in 78 (13.8%) of cases, followed by UTI 30 (5.3%), BT 16 (2.85%). There were 2 (0.35%) postoperative mortality due to thromboembolism. In group 2, wound sepsis occurred in 90 (7.61%) of cases, of which 66 (5.58%) needed restoring. Blood transfusion was done in 46 (3.89%) of cases. Febrile morbidity occurred in 36 (3.04%) of cases.

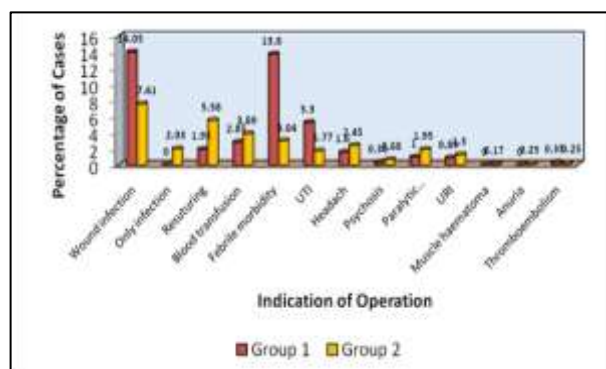


Figure 6: Distribution of cases according to postoperative complications.

There were 2 (0.17%) cases of muscle haematoma post-operatively; exploratory laparotomy was done to drain out haematoma in both cases. there were 3 (0.25%) cases that developed Anuria postoperatively. There were 3 (0.25%) post-operative mortality due to thromboembolism. It is clear that there is significant decrease in wound sepsis in group 2 as compare to group 1, and rate of restoring increased in group 2.

DISCUSSION

The present study is a prospective and retrospective hospital record based study, carried out at the department of obstetrics and gynaecology at Shyam Shah Medical College and associated Gandhi Memorial Hospital, Rewa,

to assess pattern of caesarean section and its outcome before and after introduction of JSY and maternal ambulance services. Results of present study were analyzed, and compared with the other studies conducted before.

Socio Demographic characteristics of study population

Age

Maximum number of caesarean sections in group 1 and group 2 were in age group of 18 to 35 years of age which was 83% and 98% respectively, which is comparable with the Naidu P, Chakravarty, Kumar A, Soin U, and Unnikrishnan B et al study done in South coastal India.⁸⁻¹² It also reflects the maximum fertile period of women's life and common child bearing age group.

There is significant decrease in number of patients in less than 18 years of age between group 1 and group 2 which could be an indirect effect of improved awareness regarding ill effects of underage pregnancy.

Parity

The maximum numbers of caesarean cases were observed in primiparous women in both the groups (52.1%, 50.4% respectively) which are comparable to study done by Kumar A at Shimla, and Soin et al.^{10,11} In a study by Unnikrishnan B et al, 47.8% cases were primiparous and 46.6% were multiparous which is comparable to present study.¹²

Residence

In both the group rural population is main contributor (62%, 79% respectively) but has increased significantly over last decade which can be correlated with the improved maternal transport facility across the Rewa division.

Booking status

Maximum number of cases in both group belonged to partially booked + unbooked status (67.4%, 56.2% respectively) which is comparable with study done by Subedi S where 98% cases were unbooked or partially booked.¹³ In a study done by Haider G et al done in Hyderabad Sindh, 56% cases were unbooked, Hafeeze M et al reported 61.38% unbooked cases while in study done by Unnikrishnan B et al, 87.5% case were booked which could be reflection of overall better health indicators in South Indian States in our country.^{12,14,15}

Type and incidence of caesarean section

In present study majority of the caesarean sections in group 1 (82.39%) were emergency compared with only 17.6% of elective Caesarean delivery, in group 2 (71.6%) were emergency and 28.4% were elective, Mutihir et al

reported similar findings.¹⁶ This high rate of emergency Caesarean section could be attributed to the fact that these are tertiary health facilities which serve as referral centers where complicated labors could be managed more effectively. In most cases, the lifesaving CS remains the only choice.¹⁷ Another possibility is the dearth of expertise at secondary health facilities in these regions. Therefore, experts that could manage complicated labour are only available at the tertiary health facilities. Increase in number of emergency caesarean rate in present study is a direct result of 24 hours availability of maternal ambulances services across the region which could transfer the patients to our institute whenever emergency arose at peripheral centers.

During the study period in group 1 there were 6050 deliveries out of which 562 were delivered by caesarean section (9.3%), in group 2 there were 8674 deliveries out of which 1182 were delivered by caesarean section (13.6%). There is significant increase in incidence of caesarean section in group 2 as compared to group 1. This rise in caesarean section rate is comparable with B Unnikrishnan et al (23.27%), Shanti Set al (19.9%), Sobande A et al (21.1%), while Gulfareen H et al found 64.7% caesarean rate in their study done in Hyderabad, Sindh Pakistan in a tertiary care hospital.^{12,13,17,18} Increase in caesarean section rates may be a direct effect of universal coverage of JSY services and round the clock availability of maternal ambulance services but other causes should also be taken care of and be analyzed as we did in present study and is discussed here in detail.

According to Ratnam, the rising trend in caesarean section rates is not only limited to the developed countries but also includes several developing countries, there is almost 1% rise per year in the caesarean rate in the USA/Canada compared to an increase of 0.5-0.75% per year in some of the countries in developing world.¹⁹

Indications of caesarean section

The most common indication for which the rise in caesarean section rate seen in our study was 'repeat caesarean section', in group 1 was 21.7% and in group 2 it was 32.2%. Lubna Ali from Karachi Pakistan reported repeat caesarean section the commonest indication for caesarean section, similar trends have been found in Northern Greece (30.9%) by Mersaovdi et al.^{20,21} So the decision for primary caesarean section is important unless there is a clear, compelling and well supported justification for caesarean section, a carefully supervised justified trial of labour is necessary.^{22,23} Trial of scar in singleton pregnancies can be given to reduce the rate of repeated caesarean section as the risk of uterine rupture is low 0.3%.²⁴ Successful vaginal birth after caesarean (VBAC) in grand multiparous does not lead to increased maternal complication.²⁵ Increase in institutional deliveries because of JSY and maternal transport facilities, is a direct cause of increase in primary caesarean rates resulting in more and more repeat

caesareans sections because of a generalized low threshold for the trial of labour in these patients for the fear of scar rupture and its ill consequences.

For women who have had a previous CS, a movement to prevent repeats CS was largely driven by mothers supporting vaginal birth after Caesarean section. They helped to influence change in standard medical practice, and rates of VBAC rose in the 1980s and early 1990s.²⁶ A major turning point occurred in 1996 when a well-publicized Nova Scotia study reported that vaginal delivery after previous CS resulted in more maternal complications than did repeat CS.²⁷ Subsequent logistical and liability concerns led many hospitals to enact overt or de facto bans of VBAC.²⁸ As a result, the rate at which VBAC was attempted fell from 28.3% in 1996 to less than 10% in 2010.²⁶⁻²⁸ There were controversial findings on the risks and benefits of trial of labour and elective repeat CS, and little or no evidence on short- or long-term neonatal outcomes after trial of labour compared to elective repeat CS.²⁹ Notwithstanding, enhanced access to VBAC has been recommended based on current findings on the safety of VBAC compared to repeat CS, indicating that 60% to 80% of women can achieve a safe vaginal delivery after a previous lower uterine segment CS.^{30,31} A similar recommendation also emerged from the National Institutes of Health VBAC conference panel in March 2010.²⁹ It must be noted that a study published in 2012 that used a restricted patient preference cohort design demonstrated that planned elective repeat CS in women with one prior CS was associated with lower fetal risk and lower rates of infant death or critical outcome than planned VBAC however, the possibility that confounding by indication influenced the outcome of this study cannot be ruled out.³³ Ultimately, due to the decline in attempted VBACs and concerns from hospitals and care providers about VBAC safety, a quick reduction in the rate of elective repeat CS is unlikely. In present study no case of previous caesarean has been medically induced as this is a general guideline that we are following, while evidences are there, which are favoring induction in previous section cases if properly selected.³³⁻³⁵ Therefore institutional protocol for managing these pregnancies more appropriately is required in terms of performing elective inductions in those patients who follow a certain set of criteria.

Second most common indication for which there is rise in caesarean section rate seen in present study was 'Failed Medical Induction'. In group 1 percentage of caesarean section for failed medical induction were 3.3% while in group 2 it was 10.65%, this is comparable to study done by Arulkumaran et al (16.5%) Unnikrishnan B et al.(8.8%).^{12,19} Dunne C et al found that elective induction leads to more unplanned caesarean section in nulliparous women and to increased postpartum complication for both nulliparous and multiparous women.³⁶

The significant increase in caesarean section rate for failed medical induction in group 2 as compare to group 1

could be due to increased number of planned inductions. There are increasing number of patient who report to our hospital at 40 weeks plus gestation if they don't go in spontaneous labour and as per our hospital protocol these patients are taken up for planned medical induction before 41 weeks. Earlier due to lack of awareness and maternal transport services patients used to remain at home waiting for spontaneous labour but now they come to hospital and get medically induced if fulfilled criteria for induction.

Third most common indication for which there has been a rise in caesarean section rate seen in our study was 'oligohydramnios' in group 1, severe oligohydramnios as indication for caesarean section was 1.9% while in group 2 it was 5%, this is comparable to study done by Jasia J et al (4.68%), Subhashini R et al (8.52%) and Fatima R et al 9.5%).³⁷⁻³⁹ This significant difference between group1 and group 2 could be due increased detection rates of oligohydramnios as a result of better Antenatal care and maternal transport services.

The incidence of Obstructed labour and DTA cases decreased significantly in study group 2 (4.48%) as compare to study group 1 (9.54%). This is comparable to study done by Haider G et al (6.5%).¹⁴ Shanti subedi reported 1.5% cases of obstructed labour while Unnikrishnan B et al reported only 0.5% cases of obstructed labour in their study which denotes better antenatal care and transport services in south India.^{12,13} The significant decrease in incidence of obstructed labour and DTA cases in group 2 could be a direct positive effect of JSY and maternal ambulance services by which patients are transported to tertiary care centre earlier before they go to obstruction and DTA.

Complications of caesarean section

Per-operative complication

In group 1 Intra-operative atonic PPH was the most common complication observed followed by previous adhesion (5%), extension of uterine incision (3.7%), in group 2 there was marked decrease in number of atonic PPH (1.95%) as compared to group1, there were only 1.1% cases had extension of uterine incision in group 2, this may be a general effect of improved skills in managing these cases. 6.5% cases had adhesions in group 2 which is due to increase rate of repeat caesarean sections rate. Intra-operative blood transfusion increased in group 2 (1.86%) as compare to group 1 (1%), which could be due to betterment of Blood bank facilities in our hospital but may also be due to the fact that because of ambulances services more and more complicated and underprivileged pregnant females are being brought to the hospitals now and being effectively managed.

Post-operative complication

In group 1 wound infection was the most common (14%) postoperative complication, out of which only 1.9% needed restoring, this was followed by febrile morbidity (13.8%), UTI (5.3%), blood transfusion (2.85%), paralytic ileus (1%). In group 2 also the most common postoperative complication was wound infection (7.6%), out of which 5.6% cases needed restoring, second most common postoperative complication in group 2 were febrile morbidity (7%) followed by Blood transfusion (4%). This is comparable with the study done by Ugawu EO et al and Sobade AA et al.^{18,40} There has been significant decrease in wound infection rate in group 2 as compared to group 1 indicating betterment of maternal intraoperative and postoperative care.

CONCLUSION

A significant rise in institutional and C-section delivery is found between 1992-93 (NFHS-1) and 2007-08 (DLHS-3) in most of the states in India. The scheme like Janani Suraksha Yajona (JSY) may have a great impact on accepting institutional deliveries by poor women. Rising institutional delivery may be a reason of the increase of CS in India. An increase in the rates of caesarean section delivery is a burden on health system. Unnecessary caesarean delivery also put strain on family and may complicate maternal and child health. Therefore, the decision to perform a C-section delivery must be chosen carefully and should not be overshadowed by other unreasonable factors. Utilization of ANC, better doctor patient communication, doctor's commitment to reduce the rate of CS, government's intention to develop better health care infrastructure may help to reduce the high and increasing rate of caesarean delivery in this era of high institutional deliveries because of more & more utilization of JSY and Maternal ambulances services.

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Conflict of interest: None declared

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

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