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Original Research Article

Comparative study of maternal and perinatal outcomes between elective and emergency caesarean section in term pregnancy at a tertiary care centre

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ABSTRACT

Background: One of the most common surgical procedures done worldwide is the Caesarean section. The goal of the current study is to ascertain the problems and outcomes for mothers and newborns in two groups of pregnant women who had elective and emergency caesarean sections. So that measures can be taken to reduce morbidity and mortality in near future.
Methods: A prospective comparative observational study carried out in department of Obstetrics and Gynecology, Jawaharlal Nehru Hospital and Research Centre, Bhilai, Chhattisgarh. All patients who underwent caesarean section are divided into two groups elective and emergency. Two groups were compared on the basis of different parameters like age, parity, booking status, indication, maternal and neonatal complications.
Results: The incidence of caesarean section was 51.15%. The proportion of elective and emergency CS was 39.55% and 60.44% respectively. Most of the complications were more common in emergency group.
Conclusions: The incidence of caesarean section is high in JLNH&RC, Bhilai and overall complication rate was more common in emergency group.

Keywords: Comparative study, Comparison between elective and emergency section, Elective caesarean section, Emergency caesarean section, Perinatal outcome comparison in elective and emergency caesarean section

INTRODUCTION

Caesarean section is defined as the birth of a fetus through incision in the abdominal wall (Laparotomy) and the uterine wall (Hysterotomy). This definition does not include removal of the fetus from the abdominal cavity in the case of rupture of uterus or in case of an abdominal pregnancy.[1] According to NFHS 5, in India, births in a private health facility delivered by caesarean section is 47.4 % in Year 2020-21 which was 40.9% in NFHS-4 (2015-16) and that in public health facility is 14.3% in year 2020-21 which was 11.9% in NFHS-4(2015-16).[2]

According to NFHS 5, in Chhattisgarh, births in a private health facility delivered by caesarean section is 57.0% in Year 2020-21 which was 46.6% in NFHS-4 (2015-16) and that in public health facility is 8.9% in Year 2020-21 which was 5.7% in NFHS-4(2015-16).[2] Based on the timing when a CS needs to be done, the indications are grouped under one of four categories.

Category 1 or emergency CS

There is an immediate threat to the mother or the fetus. Ideally, the CS should be done within next 30 minutes. Some examples are abruption, cord prolapse, scar rupture, scalp blood pH<7.20 and prolonged fetal heart rate decelerations<80 bpm for >9 minutes.

Category 2 or urgent CS

There is maternal or fetal compromise, which is not immediately life threatening. Here the delivery should be completed within 60–75 minutes and cases are those with fetal heart rate abnormalities of concern. Category 3 or scheduled CS-There are number of indications in this category. These are cases where the mother or physician cannot wait to elect a date for delivery nor does it mean that a CS should be done on that day. In some cases, there may be a debate whether they should have a CS or an elective induction. Common examples are preterm IUGR, moderate-to-severe preeclampsia where continuation of pregnancy may cause morbidity to the mother or fetus but an exact time frame cannot be pinpointed but waiting would increase the risks.

Category 4 or elective CS

Mother and staff elect the date and time of delivery. Malpresentations, previous CS where the mother request CS, nonbleeding placenta previa, HIV infection are some of the category 4 cases which are listed for elective CS. Where possible, it is done after 39 weeks to reduce the incidence of tachypnoea of the newborn and admission to the special care baby unit.[3]

Postoperative maternal complications were found in 40.6% in emergency cases as compared to 19.3% in elective cases. The most common complications were abdominal distension and UTI in both groups. This difference is statistically significant.[4,5] The fetal outcome in terms of birth asphyxia, meconium-stained liquor and need for Neonatal ICU admission were significantly (p value 0.05) higher in emergency caesarean section than in elective caesarean section.[6] Most common indication for CS is previous caesarean section for emergency as well as elective group. Fetal distress, labor dystocia and abnormal fetal presentation are other common indications for primary caesarean section.[7]

In recent years, with improved anesthetic techniques, easy availability of broad- spectrum antibiotics, improved transfusion medicine and improved neonatal care, caesarean section has become safer in comparison with old times when these facilities were not available.[8] Every operative procedure has its own complications. Complications can be maternal or neonatal. Maternal Complications could be intraoperative or postoperative. Intraoperative complications include hemorrhage, extension of uterine incision, urinary tract injury, bowel injury, injury to newborn, amniotic fluid embolism and unanticipated gynecological or surgical pathology. Early postoperative complications include reactionary hemorrhage, retention of urine, paralytic ileus, disseminated intravascular coagulopathy (DIC), pulmonary embolism, infection, wound problems.[9] The most common complications were abdominal distension and UTI in both groups. Maternal complications were found in 40.6% in emergency cases as compared to 19.3% in elective cases, in postoperative period. This difference is statistically significant.[10,11]

Fetal complications are also there. Fetal complications after caesarean section are birth asphyxia, tachypnoea, sepsis, need for Neonatal ICU admission. These were significantly (p value 0.05) higher in emergency caesarean section group than in elective caesarean section.[12] Mode and time of delivery has great impact on maternal and perinatal outcomes. It has been observed that the proportion of caesarean section mode of delivery is increasing.

This study is an attempt to compare the maternal and perinatal outcomes in elective and emergency caesarean sections. The results of study will be useful to provide recommendations to reduce maternal and perinatal complications. This study can help us to know the maternal and perinatal complications in both the groups and will help to predict the commonly associated complications in certain groups to avoid major complications as a consequence and can be life threatening. It will also help us to predict the commonly associated complications in certain groups to avoid major mishaps.

METHODS

Hospital based comparative prospective observational study was conducted at Department of Obstetrics and Gynaecology, J.L.N. Hospital and Research Centre, Bhilai, Chhattisgarh over 1 year (January 2023 to January 2024). 266 participants were included (160 in emergency group and 106 in elective group).

Antenatal patients with gestational age >37 weeks who underwent caesarean section and gave consent for participation in the study were included in this study whereas, antenatal patient with gestational age <37 weeks, normal vaginal delivery, vaginal birth after caesarean (VBAC), instrumental deliveries, patient who did not give consent for participation in the study were excluded.

A predesigned proforma was prepared in accordance with study objectives. The proforma was prepared in English. Permission to conduct the study and ethical clearance was obtained from the Institutional Ethics Committee. Participants were fully informed about the purpose, procedure of study through informed consent form. Participation in this study was voluntary. Participants were informed that all records pertaining to the study would be confidential and that numbers instead of names would be used to identify the participants and data would be used for

academic purpose only. Participants were informed that they would get correct and appropriate treatment irrespective of their participation in the study. After protocol approval, data from patients in the manner mentioned was collected. All responses were tabulated using Microsoft-Excel 2016 Software.

Graphical representations were made wherever necessary. Statistical analysis was performed by the SPSS program for Windows, version 20.0. Continuous variables were presented as mean±SD and categorical variables were presented as absolute numbers and percentage. Data was checked for normality before statistical analysis. Comparison of mean for normally distributed continuous variables was compared using the unpaired t test, whereas the Mann-Whitney U test was used for those variables that were not normally distributed. Categorical variables were analysed using either the chi square test or Fisher's exact test. If $p>0.05$ then it is not significant, and if $p<0.05$ then it is significant.

RESULTS

During the study period, total number of deliveries in JLNHRC were 520, out of which 266 patients underwent caesarean section. Out of these, emergency caesarean sections accounted for 161 cases while elective caesareans accounted for 105 cases. From Figure 1, total number of caesarean sections were 266 during the study period. The maximum number of patients underwent emergency CS (60.53%). From Figure 2, it is evident that the maximum number of patients in Group A were in the age group of 31-40 years (55.23%) whereas, in Group B the major chunk of patient was in age group 21-30 years (70.19%). The mean age in group A is 31.14 years whereas, in group B it is 28.67 years. For test of significance, here we used "Chi-square test". So, here difference between age group in group A and group B is statistically significant ($p<0.05$). From Figure 3, In both groups maximum number of patients were in BMI range between 18.5-24.9 kg/m^2 i.e., in group A (elective CS) 91.43% and group B (emergency CS) 96.27%. Test of significance used here was "Chi-square test". Difference between two groups is not statistically significant (p value 0.1889).

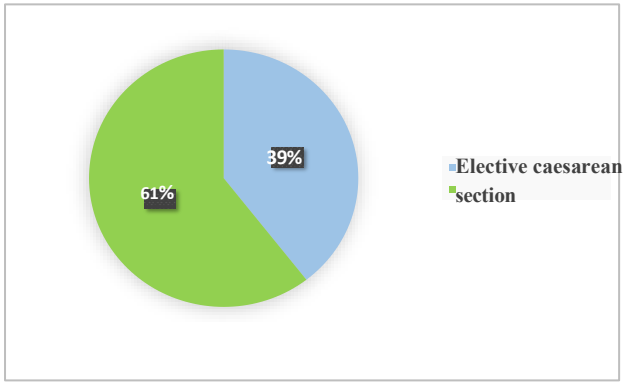

Figure 1: Comparison of incidence and distribution.

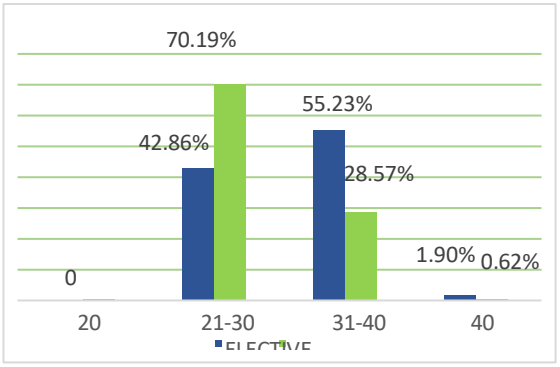

Figure 2: Comparison of age.

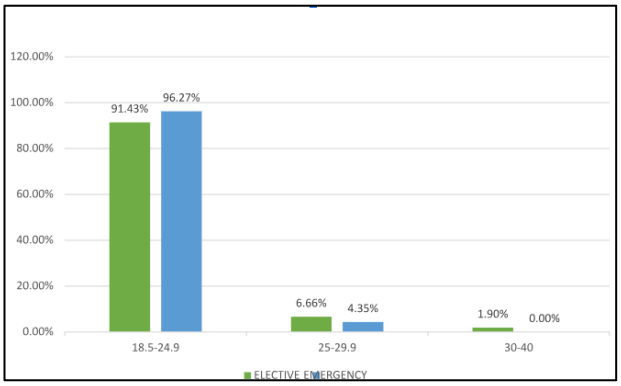

Figure 3: Comparison of BMI (Pre-pregnancy).

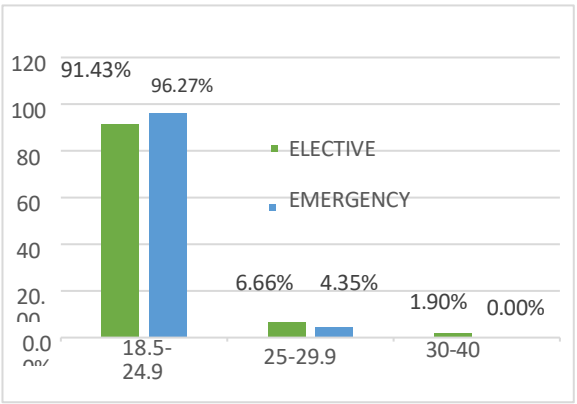

Figure 4: Booking status.

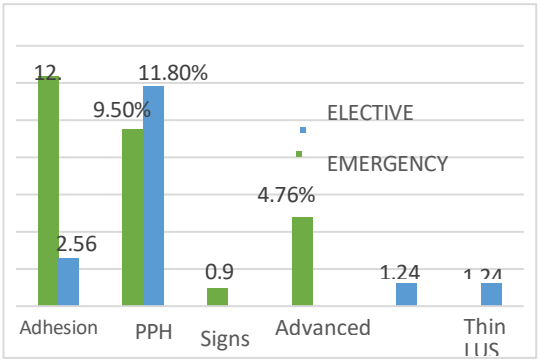

Figure 5: Comparison of intra-op complication.

From Figure 4, it is shown that the maximum number of patients in both groups were booked i.e., in group A (92.38%) and group B (85.71%). For test of significance, we used "Chi-square test". Hence, the difference was not statistically significant (p value 0.1188).

From Table 1, we can see that the maximum number of patients in group A were multigravida (75.24%) whereas, in group B maximum number of patients were primigravida (81.37%). For the test of significance, here we used "Chi-square test". So, here the difference between group A (elective CS) and group B (emergency CS) is statistically significant (p value<0.05).

From Table 2, the most common indication in group A (elective CS) was previous CS (73.33%), whereas in group B this indication comprised only 19.25%. CS for breech was performed electively at every occasion i.e., group A (8.57%). Fetal distress was most common indication in emergency group i.e., 45.96%.

From Figure 5, it is seen that the maximum number of patients from group A had intraoperative adhesions (12.38%) compared to only 1.86% from group B, which is statistically significant (p<0.05). Advanced bladder was encountered in 4.76% from group A whereas, there were no such complication seen in group B. This difference is statistically significant (p<0.005). For the test of significance, we used "chi-square test".

From Table 3, it is evident that the most common post-operative complication in both groups was abdominal distension i.e., in group A (7.62%) and group B (9.32%). For the test of significance, we used "chi-square test". The results were not significant.

From Table 4, it is seen that in both groups A and B the most common complication was hyperbilirubinemia i.e., 30.48% and 38.51% respectively. For the test of significance, here we used "chi- square test". The difference is not statistically significant (p>0.05).

In the study, only one neonatal death was reported in emergency group which occurred on Day 2 of life due to HIE. In this case, the indication of CS was fetal distress.

From Table 5, maximum NICU stay was seen in group B (emergency CS). The mean duration of NICU stay was 5.93 days in group A, whereas 6.58 days in group B. Here, we used unpaired t-test as a test of significance. The difference is statistically significant (p<0.05).

Table 1: Comparison of patients according to parity in Group A (Elective CS) and Group B (Emergency CS).

Category/ parity	Group A Elective CS (n=105)		Group B Emergency CS (N=161)		P value
Parity	**Number**	**%**	**Number**	**%**	
Primigravida	26	24.76	131	81.37	0.0001
Multigravida	79	75.24	30	18.63	

Table 2: Comparison of Patients according to Indication of CS in Group A (Elective CS) and Group B (Emergency CS).

MSL	**0**	**0**	**19**	**11.80%**
Non descent	0	0	3	1.86%
NRNST	0	0	13	8.07%
Second stage arrest	0	0	1	0.62%
Failed induction	0	0	5	3.11%
NPOL	0	0	12	7.45%
Fetal distress/Eclampsia/APH/MSL/Non descent/second stage arrest/ failed induction/DTA/NPOL		Can not be analysed. Fetal distress does not happen in elective CS.		
Elderly gravida		Already analysed in age parameter		
MSL	0	0	19	11.80%
Non descent	0	0	3	1.86%
NRNST	0	0	13	8.07%
Second stage arrest	0	0	1	0.62%
Failed induction	0	0	5	3.11%
NPOL	0	0	12	7.45%
Fetal distress/Eclampsia/APH/MSL/Non descent/second stage arrest/ failed induction/DTA/NPOL		Can not be analysed. Fetal distress does not happen in elective CS.		
Elderly gravida		Already analysed in age parameter		

Table 3: Comparison of patients according to maternal complications (post-op) in group A (Elective CS) and group B (Emergency CS).

Post op Complications	A. Elective CS (n=105)		B. Emergency CS (n=161)		P value	Results
	Number	%	Number	%		
Abdominal distension	8	7.62	15	9.32	0.8239	Not significant
Blood transfusion	5	4.77	13	8.07	0.3301	Not significant
Eclampsia	1	0.95	1	0.62	1	Not significant
UTI	2	1.90	9	5.59	0.209	Not significant
Wound infection	1	0.95	3	1.86	1	Not significant

Table 4: Comparison of patients according to neonatal complications in group A (Elective CS) and group B (Emergency CS).

Neonatal complications	A. Elective CS (n=105)		B. Emergency CS (n=161)		P value	Significance
	Number	%	Number	%		
Fever	3	2.86	3	1.86	0.6833	Not significant
Hyperbilirubinemia	33	31.43	62	38.51	0.2411	Not significant
LBW	1	0.95	1	0.62	1	Not significant
RDS	1	0.95	4	2.48	0.651	Not significant
Fever, Tachypnea, NNJ	1	0.95	0	0	0.304	Not significant
NNJ with SGA	1	0.95	0	0	0.304	Not significant
Significant weight reduction	1	0.95	1	0.62	1	Not significant
Harelip and cleft palate	1	0.95	0	0	0.304	Not significant
Foot deformity	0	0	1	0.62	1	Not significant
NNJ, Sepsis	0	0	1	0.62	1	Not significant
Tachypnea	0	0	1	0.62	1	Not significant
Vomiting	0	0	2	1.24	0.52	Not significant
Death	0	0	1	0.62	1	Not significant

Table 5: Comparison of patients according to NICU Stay in group A (Elective CS) and group B (Emergency CS).

Neonatal hospital stays	Elective CS (n=105)	Emergency CS (n=161)	P value	Results
	Mean±S.D	Mean±S.D		
Duration of NICU stay	5.93±1.67	6.58±1.78	<0.001	Significant

DISCUSSION

Caesarean sections have been long practised as a lifesaving procedure for the mother and fetus. Though it is classified as a major procedure, the incidence of CS has risen considerably over years all over the world. Nevertheless, its advantages do not justify its rising trend since it carries considerable disadvantages when compared with normal vaginal delivery. Though advances in the field have reduced maternal and fetal mortality considerably, the maternal and fetal morbidity after CS still persist. The present study was undertaken to compare and analyse the maternal and fetal morbidity associated with elective and emergency CS.

Incidence

With the reference to Figure 1 from results, overall, there were 266 caesarean sections out of 520 deliveries during the study period. Thus, the incidence of caesarean section in our hospital was found to be 51.53%. Of these, 39.47% cases were elective and 60.53% were emergency CS giving an approximate ratio of 1.54:1 for emergency versus elective CS.

The hospital, JLNH&RC being a tertiary care centre, we deal with all kinds of complicated and referred ANC patients. So, the incidence of caesarean section is higher in our hospital, with emergency CS being considerably more than elective CS indicating that we give trial of normal vaginal delivery to maximum pregnant females.

Subedi et al conducted a study in Manipal and reported the rate to be 36.76%.[13] Govind et al conducted a study at Kohzikode and concluded that the rate of caesarean section was 36.64%.[14] Pate et al conducted a study in Ahmedabad and found incidence to be 42.8% which is comparable to the study.[15]

Age distribution among the patients undergoing caesarean section

With the reference of Figure 2 from the result of present study, maximum number of emergency CS (70.19%) were in the age group of 21-30 years whereas 55.23% cases from elective group were between the age of 31-40 years. This finding was comparable to the study conducted by Renuka et al in which emergency CS rates (62.7%) were more common in the age group of 18-24 years than elective CS (49.3%).[16] Another study conducted by Saini et al in 2023 found 64.8% patients of emergency group were between 19-25 years.[17] 56.2% of patients underwent elective CS in age group of 26-35 years. Thus, our study concluded that with advancing maternal age, the rate of elective CS is increasing due to associated obstetrical and medical complications.

BMI

With reference to figure 3 from result, in present study, 155 patients in emergency CS had BMI ranging between 18.5-24.9 kg/m^2 as compared to 96 patients with similar BMI in elective group. There was not much difference in rates of elective and emergency CS in overweight patients, in contrast to the study conducted by Renuka et al in which the reverse was true. 81 patients in emergency CS group had BMI ranging 30-40 kg/m^2 when compared to only 14 patients underwent more emergency CS as compared to elective CS and this finding was comparable to study conducted by Renuka et al.[16]

Obesity is a risk factor for caesarean delivery and the risks and challenges of caesarean delivery increases with increasing severity of obesity. Many associated factors such as maternal age, gestational diabetes, hypertension, pre-eclampsia, fetal macrosomia play important roles in association with BMI for CS.

Booking status

With reference of figure 4 from results where the comparison of two groups was done according to their booking status. In the study, unbooked cases underwent more emergency CS than elective CS. Though this finding was not statistically significant, it was comparable to other studies conducted by Subedi et al, Govind et al, Renuka et al.[13,14,16] These findings showed that women with no proper antenatal care had more emergency CS. Hence, we may conclude that regular antenatal visit may play a significant role in lowering emergency caesarean rate.

Parity

With reference to Table 1 in results, in present study, most of the patients who underwent emergency CS were primigravida and majority of the patients who had elective CS were multigravida. This finding was comparable and statistically significant in Saini et al, Diana et al study.[17,18]

Indication of CS

According to the Table 2 in result, indications of caesarean section in both groups were compared. With the same reference in the study, it was noted that most frequent indication for elective caesarean section was previous CS i.e., in 73.33% followed by 8.57% for breech presentation. The most common indication of emergency CS was fetal distress accounting for 45.34% followed by MSL (12.42%).

In the study, 3.73% of emergency CS and 3.81% of elective CS were performed on maternal request. This is higher than a maternal request rate of 0.57% in a study conducted by Thakur et al.[22] These findings are comparable to some studies as shown in table. In contrast, the rate in our hospital is lower than in the United Kingdom and Northern Europe where around 6% to 8% of all primary CS were performed at the request of mother. Since, such un-indicated surgeries carry numerous complications, it should be discouraged.

Maternal complications

Taking reference from Figure 5 and Table 3 in results, the overall maternal complications (both intra-operative as well as post operative) were more in emergency group as compared to elective group. These findings were comparable to studies conducted by Govind et al, Nnadi et al, Sreenivas et al.[14,21,23] Intraoperative complications are compared in Figure 5. Most common intra-operative complication was hemorrhage in emergency group (11.80%) whereas it was only 9.5% in elective group. Most common complication in elective group was intra-operative adhesions (12.38%).

Post operative complications are compared in Table 3 in results. On comparison of post-operative period, complications in the form of abdominal distension, need for blood transfusion, eclampsia, UTI and wound infection were seen more in emergency group, which were not statistically significant ($p>0.05$). Most common complication was abdominal distension in both groups i.e. elective (7.62%) and emergency (9.32%) groups which was statistically not significant ($p=0.8239$). There was a significant incidence of UTI in emergency group, in a study conducted by Suwal et al, ($p=0.003$).[24] Another study conducted by Gurunule et al, also had statistically significant significance with the type of CS (more in emergency group) with respect to UTI ($p<0.05$).[20] Whereas, in the study UTI was seen in 1.9% in group A and 5.59% in group B with p value being 0.209 which is statistically not significant.

Neonatal complication

In the study, with the reference to table 3, neonatal hyperbilirubinemia was the most common complication in both the groups (elective=30.48% and emergency=38.51%). In the study conducted by Renuka

et al hyperbilirubinemia, the most common complication in elective group, accounted only 8.5% of newborns which is in contrast to our study.[16] Most of the cases were of physiological jaundice of newborn which was easily managed by phototherapy and others were cases of breastfeeding jaundice which was due to inadequate breastfeeding. Neonatal complications were more in emergency group and these findings were comparable to studies conducted by Renuka et al (30.1% in emergency vs 20.9% in elective group), Sreenivas et al (neonatal complications were common in emergency group i.e. $p<0.05$).[16,23]

NICU stay

Neonatal intensive care unit (NICU) provides care to the newborn who needs specialized medical attention. In our hospital, all the babies born through caesarean section are kept in NICU for observation, as a protocol.

With the reference to Table 5 in present study, the duration of stay in NICU of newborns was more for babies born out of emergency CS as compared to elective CS, the mean stay being 2.97+2.63 and 3.80+3.04 respectively but it is not significant statistically. This finding was compared to the studies conducted by Renuka et al where NICU stay was seen in 21.6% in emergency group and 11.1% in elective group.[16] Govind et al, Subedi et al, also concluded the same.[13,14] But our study is not directly comparable with previous studies due to the routine protocol of NICU admission for CS babies.

This study was conducted at a single tertiary care centre with a limited sample size, which may restrict generalization of the findings. This study was for shorter duration.

CONCLUSION

Caesarean section is a surgical procedure which can lead to numerous complications in both mother and child. A WHO study of adverse maternal and fetal outcomes carried out between 2004 to 2008 in 24 countries showed that caesarean sections are associated with increased risk for both mother and child and therefore it should only be performed when there are any clear advantages. Hence, caesarean section cannot be considered an equal alternative to spontaneous childbirth and should be viewed with caution. The trend of caesarean section is rising in most of the countries including India. Its incidence seems to be increasing in our hospital also. It is unfortunate that a number of expecting mothers with pregnancy related risk factors remain unaware of this situation and ultimately, they present as an acute obstetric emergency such as eclampsia, antepartum haemorrhage and other complications like obstructed labour.

Public health education is the most important factor. People should be educated regarding government policies and the health facilities which have been established for the common masses and they must utilize the available facilities. ANC patients and family should be encouraged to attend ANC clinic. Pregnant females should be motivated for vaginal delivery to decrease the incidence of CS and related complications. Primary health care providers and traditional birth attendants must be educated regarding the risks of injudicious use of oxytocics without proper assessment and the dangers of obstructed labour. They should be able to judge when to refer the complicated cases in order to reduce maternal as well as fetal morbidity and mortality. The existing health facilities may be improved so that antenatal and intrapartum care can be provided to all the pregnant women in society.

In the institute, psychoprophylaxis class under CSR activity is conducted on 1st of every month for pregnant ladies and their relatives to prepare them mentally for the physiological changes that occur during pregnancy and to educate them about the process of normal labour. Exercise in pregnancy is beneficial for both developing fetus and the mother unless contraindicated. For this, yoga including breathing exercise is promoted in our institute for mental and physical well-being of pregnant women.

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