



A STUDY OF MATERNAL MORBIDITY AND MORTALITY IN LOW RISK PATIENTS UNDERGOING EMERGENCY CAESAREAN SECTION IN A TERTIARY CARE CENTER IN CENTRAL INDIA

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ABSTRACT

INTRODUCTION: Caesarean section is one of the most performed surgical procedures all over the world. It is associated with high morbidity, although, the morbidity has come down over the years. Morbidity and mortality are seen to be more with emergency procedures than elective procedure.

AIM: to study maternal morbidity and mortality in low risk patients undergoing emergency caesarean section in a tertiary care center

METHODOLOGY: This was a prospective, observational, single center study performed over a period of 18 months i.e., from January 2020 to June 2021 in the Department of Obstetrics and Gynecology of a tertiary care teaching hospital situated in the Central India. Total 235 patients undergoing low risk emergency caesarean section in the tertiary teaching hospital in central India were studied. Data was collected and analyzed

CONCLUSION: the findings of the study suggest that emergency caesarean section can be safely performed in women with low-risk pregnancy with careful selection of patients and proper indication for lscs.no mortality during the study period.

KEYWORDS : lscs, maternal outcome, neonatal outcome, maternal morbidity

INTRODUCTION:

Caesarean delivery is defined as the birth of a fetus through incisions 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 the uterus or in the case of an abdominal pregnancy.) Previously, it was used to save the life of the mother and with associated mortality of 50-70%. With the immense advances in anesthetic services and improved surgical techniques the morbidity and mortality of the procedure has decreased considerably.¹ Moreover, in recent decades, the characteristics of women giving birth have significantly changed. Advanced maternal age, obesity, and comorbidities (such as hypertension and diabetes) have all increased in prevalence.² Subsequently, the rate of caesarean section has increased significantly. Latest available data suggests that around 20% of women gave birth by caesarean section worldwide, averages ranging from 5% in sub-Saharan Africa to 42.8% in Latin America and the Caribbean. It is further estimated that by 2030, 28.5% of women worldwide will give birth by caesarean section.³ Following the global trend, in 2015–16, about 19% of women had undergone caesarean section in India. The state-wise distribution shows that Telangana (60%) followed by Andhra Pradesh (42%) and Tamil Nadu (36%).⁴ Moreover, the prevalence of caesarean section was 13.7% and 37.9% in the public and private sectors, respectively. The chances of caesarean section are higher with delivery at private health facility, higher levels of education, women belonging to the upper quintiles of the household wealth, urban residence, first delivery after 35 years of maternal age, and those who received antenatal care (ANC), experienced pregnancy loss and delivery complications.⁵ Though the prevalence of caesarean section has increased, it is a major surgery associated with medical, anaesthetic and surgical complications.⁶ Apart from maternal and neonatal risks, it has implications for future pregnancies.⁷ Problems associated with caesarean section lies in its economic costs. Mean length of hospitalization for vaginal delivery is half the mean length of caesarean section which is one of the economic benefits of vaginal delivery.⁸ Since caesarean section has increased the length of hospital stay and surgical complications, it affects quality of life of those women who go under caesarean section. Also, mortality and maternal complications of caesarean section is several times higher than vaginal delivery, increasing its postpartum mortality rate with no

improvement in its complications.⁹ Pregnancy is considered as a high-risk, if it is associated with any risk factors about the pregnancy to the mother or the baby and are nearly always managed with elective caesarean section. On the other hand, low-risk pregnancy is associated with no identified risk factor for either the mother or in the baby.¹⁰ However, acute obstetric emergency in low-risk pregnancies require emergency caesarean section. Moreover, indications of emergency caesarean section in low-risk pregnancies has not been evaluated adequately. Thus, the present study was performed to evaluate the maternal morbidity and mortality of emergency caesarean section in low-risk pregnancies.

METHODOLOGY:

The present study protocol was approved by the Institutional Ethics Committee (IEC). This was a prospective, observational, single centre study performed over a period of 18 months i.e., from January 2020 to June 2021 in the Department of Obstetrics and Gynaecology of a tertiary care teaching hospital situated in the Central India. All adult patients with low-risk pregnancy that underwent emergency caesarean section in the Department of Obstetrics and Gynaecology of a tertiary care teaching hospital over a period of 18 months.

Inclusion Criteria:

Patients aged 18 years or more with low-risk pregnancy that underwent emergency caesarean section.

Exclusion Criteria:

Patients aged less than 18 years, Patient who underwent elective caesarean section, Patient who underwent emergency caesarean outside the tertiary care center, Patients who are critically ill, Patients with severe anemia, Patient with eclampsia, Patient with heart disease, Patient with diabetes mellitus, and Patient with HELLP (Haemolysis, Elevated Liver enzymes and Low Platelets) syndrome.

Characteristics Of Patients: At the time of enrolment, following parameters were noted in all the patients. Demographic Characteristics : Included age, booking status, and area of residence. Obstetric Characteristics: Included presenting complaints, parity, pregnancy type (singleton or twin), and indications of LSCS.

Neonatal Outcome: Included general condition of neonate,

birth weight, NICU admission, and neonatal death.

Maternal Outcome: Included maternal morbidity, maternal mortality, and length of hospital stay.

Study Procedure:

A total of 235 low-risk pregnant women were included in this study. All the patients were screened and explained the study procedure in their native language. The patients who were willing to participate and signed the informed consent document were enrolled in the study.

Upon enrolment, all the patients were enquired about the past history of unexplained foetal loss, previous pregnancy induced hypertension, previous caesarean section, previous curettage, and previous APH and details were recorded. Patients were then subjected to imaging procedures and laboratory investigations, so as to collect all the parameters required for completing the study. Finally, indications requiring emergency caesarean section were determined and maternal and neonatal outcomes were recorded in a especially designed case report form.

Data was collected and graphics were designed by Microsoft Office Excel 2019. Descriptive statistics were used. The categorical and continuous variables are represented as frequency (percentage) and mean (standard deviation, SD).

RESULTS:

Table 1: Distribution of patients according to age

Age groups (years)	N (=235)	%
≤ 20	15	6.38
21 – 25	96	40.85
26 – 30	97	41.28
31 – 35	23	9.79
> 35	4	1.70

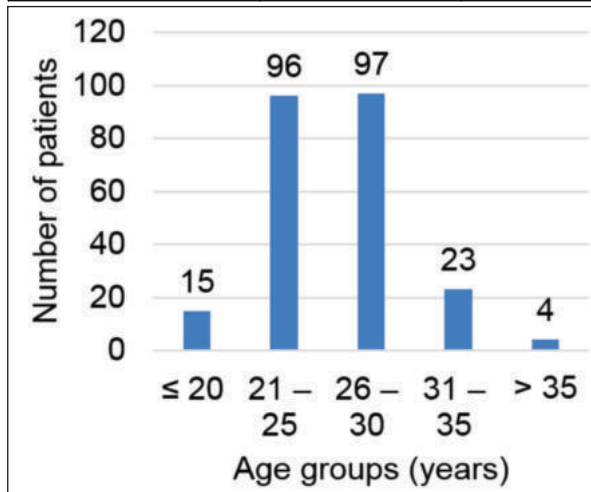


Figure 1: Distribution of patients according to age

Table 1 and Figure 1 depict the distribution of patients according to age. Majority of the patients belonged to the age group of 26 – 30 years (41.28%) followed by 21 – 25 years (40.85%), 31 – 35 years (9.79%), and ≤ 20 years (6.38%). While, least number of patients belonged to the age group of > 35 years (1.70%). The age of patients ranged from 19 to 39 years with a mean of 25.98 ± 3.82 years.

Table 2: Distribution of patients according to booking status

Booking status	N (=235)	%
Booked	154	65.53
Referral	81	34.47

Table 2 and Figure 2 depict the distribution of patients according to booking status. Of 235 patients, 154 (65.53%) were booked, while remaining were referral from other centres (34.47%).

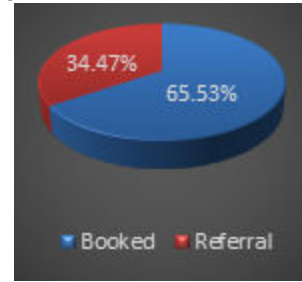


Figure 2: Distribution Of Patients According To Booking Status

Table 3: Distribution of patients according to area of residence

Area of residence	N (=235)	%
Rural	100	42.55
Urban	135	57.45

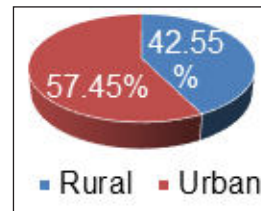


Figure 3: Distribution of patients according to area of residence

Table 3 and Figure 3 depict the distribution of patients according to area of residence. Of 235 patients, 135 (57.45%) belonged to urban areas, while remaining belonged to rural areas (42.55%).

Table 4: Distribution of patients according to parity

Parity	N (=235)	%
Primipara	94	40
Multipara	141	60

Figure 4: Distribution of patients according to parity

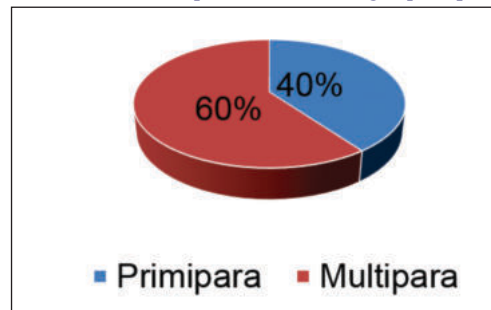


Table 4 and Figure 4 depict the distribution of patients according to parity. Of 235 patients, 141 (60%) were multipara, while remaining were primipara (40%).

Table 5: Distribution of patients according to indications of LSCS

Indications of LSCS	N (=235)	%
Foetal distress	99	42.13
Scar tenderness	49	20.85
Abnormal presentation and lie	19	8.09
Cephalo-pelvic disproportion	17	7.23
PROM	13	5.53
Severe oligohydramnios	13	5.53
Placenta previa	7	2.98
Short ICP	5	2.12

Contracted pelvis	4	1.70
Cord presentation	3	1.28
Deep transverse arrest	2	0.85
Unfavourable cervix	2	0.85
Polyhydramnios	1	0.43
Twin gestation	1	0.43

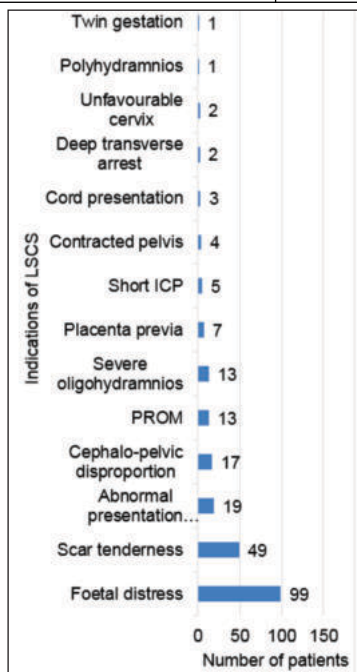


Figure 5: Distribution of patients according to indications of LSCS

Table 5 and Figure 5 depict the distribution of patients according to indications of LSCS. Of 235 patients, majority required LSCS due to foetal distress (42.13%) followed by scar tenderness (20.85%), abnormal presentation and lie (8.09%), and cephalo-pelvic disproportion (7.23%).

Table 6: Distribution of patients according to pregnancy type

Pregnancy type	N (=235)	%
Singleton	234	99.57
Twin	1	0.43

Figure 6: Distribution of patients according to pregnancy type

Table 7: Distribution of patients according to general condition of neonate

General condition	N (=236)	%
Good	230	97.46
Poor	2	0.85
IUD	4	1.69

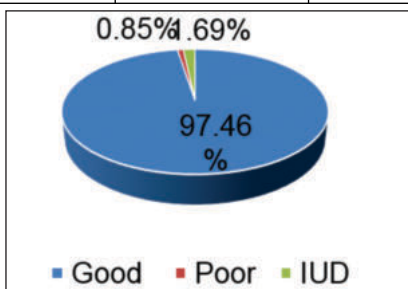


Figure 7: Distribution of patients according to general condition of neonate

Table 7 and Figure 7 depict the distribution of patients according to general condition of neonate. Of 236 neonates,

only 230 (97.46%) had good general condition, while 0.85% had poor general condition. Moreover, there were 4 (1.69%) intrauterine deaths.

Table 8: Distribution of patients according to birth weight

Birth weight	N (=236)	%
Normal	191	80.93
Low	44	18.64
High	1	0.42

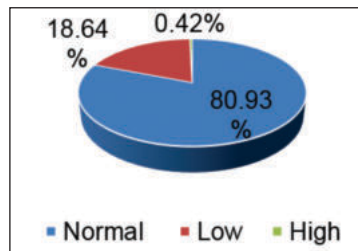


Figure 8: Distribution of patients according to birth weight

Table 8 and Figure 8 depict the distribution of patients according to birth weight. Of 236 neonates, only 191 (80.93%) had normal birth weight, while 18.64% had low birth weight. Moreover, 1 (0.42%) neonate had high birth weight.

Table 9: Distribution of patients according to NICU admission

NICU admission	N (=236)	%
Yes	6	2.54
No	230	97.46

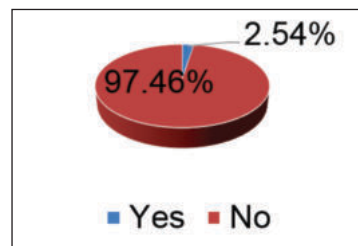


Figure 9: Distribution of patients according to NICU admission

Table 9 and Figure 9 depict the distribution of patients according to NICU admission. Of 236 neonates, only 6 (2.54%) required NICU admission, while remaining did not require NICU admission (97.46%).

Table 10: Distribution of patients according to neonatal death

Neonatal death	N (=236)	%
Yes	5	2.12
No	231	97.88



Figure 10: Distribution of patients according to neonatal death

Table 10 and Figure 10 depict the distribution of patients according to neonatal death. Of 236 neonates, only 5 (2.12%) died, while remaining survived during the study period (97.88%).

Table 11: Distribution of patients according to maternal morbidity

Maternal morbidity	N (=235)	%
No	213	90.64
Yes	22	9.36

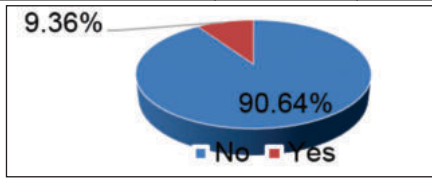


Table 11: Distribution of patients according to maternal morbidity

Table 11 and Figure 11 depict the distribution of patients according to maternal morbidity. Majority of the patients had no morbidity (94.04%). While, 22 (9.36%) patients had morbidity.

Table 12: Distribution of patients according to maternal morbidity

Maternal morbidity	N (=22)	%
Wound re-suturing	9	40.91
Atonic uterus	1	4.55
Haemorrhage + BT	9	40.91
Haemorrhage + Hysterectomy	1	4.55
Haemorrhage + BT + Hysterectomy	1	4.55
Haemorrhage + BT + Atonic uterus	1	4.55

BT: Blood transfusion

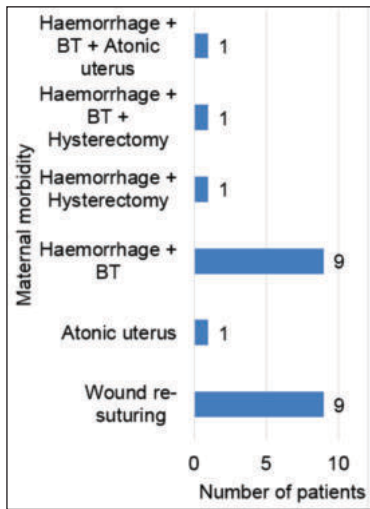


Table 12: Distribution of patients according to maternal morbidity

Table 12 and Figure 12 depict the distribution of patients according to maternal morbidity. Of 22 patients with morbidity, majority required wound re-suturing (N=9) and blood transfusion for haemorrhage (N=9) followed by atonic uterus, haemorrhage + hysterectomy, Haemorrhage + BT + Atonic uterus, and haemorrhage + blood transfusion + hysterectomy in 1 patient each.

Table 13: Distribution of patients according to maternal mortality

Maternal mortality	N (=235)	%
Yes	0	0
No	235	100

Figure 13: Distribution of patients according to maternal mortality

Table 14: Distribution of patients according to length of hospital stay

Length of hospital stay (days)	N (=235)	%
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0	10	4.25
≤ 5	188	80
6 – 10	27	11.49
11 – 20	9	3.83
> 20	1	0.43

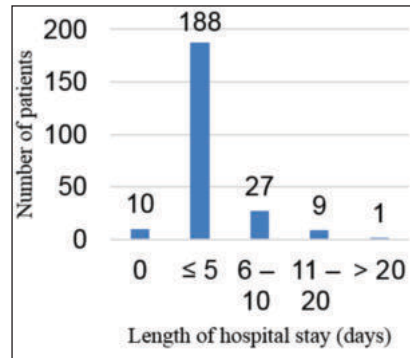


Figure 14: Distribution of patients according to length of hospital stay

Table 14 and Figure 14 depict the distribution of patients according to length of hospital stay. Majority of the patients were hospitalised for ≤ 5 days (80%) followed by 6 – 10 days (11.49%), 11 – 20 days (3.83%), and > 20 days (0.43%). Moreover, 10 (4.25%) patients did not require hospitalization following delivery. The length of hospital stay ranged from 4 to 27 days with a mean of 5.34 ± 3.02 days.

DISCUSSION

Caesarean section is the delivery of an infant alive or dead through an abdominal uterine incision after the period of viability.¹¹ Caesarean section can be considered one the earliest forms of modern birth technology. In the 20th century, there have been many new developments in the field of medicine rendering increased safety to all surgical operations, which is mainly due to the availability of antibiotics, safe anaesthesia and blood transfusion facilities. The same applies to caesarean section also, which has become an accepted standard procedure among the modern obstetric procedures reducing maternal morbidity and mortality.¹²

The indications of caesarean sections vary among institutions as no standard classification system exists for indications of caesarean section.¹³ A major challenge is that definitions are not standardized, and indications can be multiple or related.¹⁴ The careful probing of the trend and indications for the use of caesarean section may lower the pathway of caesarean rate. Our tertiary centre is one of the biggest hospitals of the city that caters the referral from large number of neighbouring districts and other states as well. With this background, the present study was conducted to evaluate the maternal morbidity and mortality in low-risk patients undergoing emergency caesarean section.

The findings of the present study are discussed as below:

1. Maternal Age

In the present study, majority of the patients belonged to the age group of 26 – 30 years (41.28%) followed by 21 – 25 years (40.85%). The age of patients ranged from 19 to 39 years with a mean of 25.98 ± 3.82 years. In a study conducted by **Bizuneh et al.**, majority of women delivered through emergency caesarean section belonged to the age group of 18-35 years (93.1%). While, younger women (<18 years) who underwent emergency caesarean section accounted for only 1.5% of all emergency cases.¹⁵ **Das et al.** observed that maximum number of caesarean sections were performed in the age group of 20-25 year (67.94%) followed by 20.90% patients in the age group of 26-30 years.¹⁶ Similarly, **Jawa et al.** reported that majority of caesarean sections were in the age group of 21-25 years (51.6%) followed by patients in the age group of 26-30 years (29.3%).¹⁷ **Sarma et al.** found that caesarean

sections was predominantly performed in the age group of 21 to 30 years (76.29%).¹⁸

In contrast to this study, several studies have demonstrated that high incidence of emergency caesarean section is associated with advancing age. This may be due to an increased incidence of placental abruption, placenta previa, breech presentation, preterm labour, and multiple gestation in parturient of advanced maternal age. Advanced maternal age is also associated with increased incidence of breech presentation and foetal macrosomia.^{19,21} Moreover, in a study from Latin American hospital, **Green et al.** showed maximum incidence in >30 years primi patients, which might reflect delayed age of marriages in the western countries.²²

Advanced maternal age is an independent risk factor of emergency caesarean section.²³ A study done by **Hordofa et al.** reported that mothers aged between 20-24 are 3.2 times more likely to undergo caesarean section as compared with those aged between 15-19 years. Those aged between 25-34 years are 3.6 times more likely to undergo caesarean section as compared with those whose age was between 15-19 years. Mothers aged 35 and above were 10 times more likely to undergo caesarean section as compared with those aged 15-19.²⁴

2. Booking Status:

Maternal and neonatal complications during the perinatal period are highly associated with non-utilization of antenatal and delivery care services and poor socioeconomic conditions of the patient. These complications were more common with unbooked than booked patients.²⁵

In the present study, majority of the patients were booked (65.53%), while remaining were referral from other centres (34.47%). Similarly, in a study conducted by **Das et al.**, results showed that 70% of women were booked for antenatal care.²⁶ In another study by **Kambo et al.**, 66% patients were booked.²⁶ Thus, suggesting good utilisation of antenatal services.

Contrarily, in another study, **Jain** observed that 52.08% were booked.²⁷ Moreover, **Sarma et al.** found that only 28% patients were booked.⁽⁸⁾ These findings suggest poor utilisation of antenatal services in various parts of India.

3. Area Of Residence:

In the present study, majority of the patients belonged to urban areas (57.45%). Similarly, **Das et al.** found that 68.98% caesarean deliveries were from urban area.¹⁶ While **Kambo et al.** found that 69% caesarean sections were performed in rural areas.²⁶ Thus, it confirms that with more facilities available in urban set-up, cases of Caesarean deliveries are more as compared to that in rural set-up.

Contradictory of the findings of present study, **Jain** observed that 61.32% patients belonged to rural areas.²⁷ Moreover, **Sarma et al.** found that caesarean deliveries were predominantly performed among women residing in were from rural areas (92.41%).⁽⁸⁾ This indicates the awareness among rural women and the improved transport facilities.

4. Parity:

In the present study, majority of the patients were multipara (60%), while remaining were primipara (40%). In a study, **Jawa et al.** reported that caesarean sections were predominantly performed in multiparous females (57%), while remaining were primigravida (43%).¹⁷ In another study, **Das et al.** observed that maximum number of caesarean sections was performed in multiparous females (52.61%).¹⁶ Similar findings were reported by **Jain** (54.29%).²⁷

Contrary to the findings of the present study, in a study conducted by **Bizuneh et al.**, most of the women who

underwent emergency caesarean section were primiparous 58.8%, 36.4% were between para 2-4 (inclusive). While, grand multiparous women made up only 4.8% of all emergency caesarean section cases.¹⁶ Similarly, **Sarma et al.** found that 70.02% were primiparous.⁽³⁸⁾ In another study, **Kambo et al.** reported that 42.4% were primigravidas.²⁶

Primiparas are known to have a higher incidence of severe hypertensive disease compared to the multipara women. As expected, hypertensive disease featured as a cause for caesarean section more often in those who had been primiparas as seen. The higher incidence of the foetal distress as indication for emergency caesarean section was probably common in primiparas in association with more prolonged labour and oxytocin augmentation, in comparison with multifarious women in whom, labour is generally shorter. Similarly, the high rate of dystocia in primiparous women can be explained by the factor untried pelvis compared to the paras. Among grand multiparas, APH was the most common indication for emergency caesarean section. This may be due to an increasing risk of placental previa and placental abruption as parity increases due to multiple repeated scars to uterine wall.²⁸

5. Indications Of Lscs:

In the present study, emergency caesarean section was predominantly performed for foetal distress (42.13%) followed by scar tenderness (20.85%), abnormal presentation and lie (8.09%), and cephalo-pelvic disproportion (7.23%). Similarly, **Sarma et al.** reported that foetal distress (30.99%) followed by repeat caesarean section (23%), failed induction (14%), PIH (12.99%), oligohydramnios (5%), cephalo-pelvic disproportion (2.02%), malpresentation (3.03%), obstructed labour (2.94%), APH (2.02%), and prolonged labour (2.99%) were the most common indications of caesarean section.¹⁸

In a study by **Bizuneh et al.**, dystocia (26.4%) emerged as the most common indication for emergency caesarean section. Foetal distress was second only to dystocia as the leading indication for emergency caesarean section accounting for about 18.8%. Furthermore, foetal malpresentation ranked third among the indications for emergency caesarean section (12.1%).¹⁵ Similarly, **Kambo et al.** concluded that dystocia (37.5%), foetal distress with or without meconium aspiration (33.4%), repeat section (29.0%), malpresentation (14.5%) and PIH (12.5%), in decreasing order, were the major indications for caesarean section.²⁶

In another study, **Ali et al.** reported that the leading indications for caesarean section were cephalopelvic disproportion (44%), malpresentations and malpositions (21%), repeat caesarean section (16%), antepartum haemorrhage (8%) and foetal distress (6%), accounting for 95% of the indications for caesarean section.²⁹

6. Pregnancy Type

A policy of planned vaginal birth for women with a twin pregnancy in a hospital setting is associated with a 30% to 40% rate of emergency caesarean section. When the first twin is born vaginally, there is still a risk of emergency section for the birth of the second twin.³⁰ The risk of delivering a twin pregnancy via caesarean section was three times that of a singleton pregnancy.³¹

In the present study, only 1 (0.43%) was twin pregnancy, while remaining were singleton (99.57%). Similarly, **Jain** reported that 1.43% pregnancies were twins.²⁷ In another study, **Bizuneh et al.** found that around 5.6% neonates were twins and thus, required emergency caesarean section.¹⁵ Thus, twin pregnancies were delivered by caesarean section.

7. Birth Weight

Foetal birth weight is one of the important factors to consider

with regards to delivery mode and clearly affects caesarean delivery rate. Small and large newborns have more caesarean deliveries than those of average weight, whereas caesarean for dystocia increases with birth weights.³²

In the present study, 80.93% neonates had normal birth weight, while 18.64% had low birth weight. Moreover, 1 (0.42%) neonate had high birth weight. To the best of our knowledge, none of the available have reported neonatal outcome in terms of birth weight following emergency caesarean section in low-risk pregnancies. Thus, findings of the present study add to the existing literature.

8. Nicu Admission

In the present study, only 2.54% required NICU admission. Similarly, **Hemant et al.** reported that 10.95% neonates required NICU admission.³³ **Bizuneh et al.** observed that 18.6% neonates were admitted to NICU for further management.¹⁵ Similarly, **Yee et al.** reported NICU admission rate of 13.1%.³⁴ Recently, **Khasawneh et al.** concluded that caesarean section is associated with increased risk of NICU admission.³⁵ According to a study by **Kamath et al.**, neonates born by caesarean delivery (9.3%) had higher NICU admission rates compared with the vaginal birth after caesarean (4.9%).³⁶ Thus, supporting the findings of the present study.

9. Neonatal Death

Although usually births by caesarean section need to be carried out in the benefit of the baby, there are major risks (often lethal) accompanying this type of birth. In a study conducted in California by **MacDorman et al.**, that included more than 580,000 births it has been ascertained that both children born by planned caesarean section and children born by unplanned caesarean section bear a four times higher risk of death before hospital discharge than children born vaginally (8 deaths per 10,000 birth for each planned or unplanned caesarean and 2 deaths per 10,000 births for vaginally born infants).³⁷

In the present study, only 2.12% neonates died. **Bizuneh et al.** reported that 2.8% of the neonates died following after caesarean section.⁵ **Hemant et al.** reported neonatal death in 1.43% neonates.²³ A study in Africa by **Shah et al.** found that the success rate in delivering a live neonate by emergency caesarean section was as high as 97.2%.³⁸ Thus, in the present study, neonatal mortality was marginal and similar to that cited in literature.

10. Maternal Morbidity

With an increase in caesarean delivery, maternal morbidity and mortality has risen. A number of recent studies have documented an increased incidence of placenta previa and accreta with repeated uterine scars. The percentage of peripartum hysterectomy that occurred in a setting of a previous caesarean delivery increased from 27% to 57%. Of significance was that placenta accreta as an indication of peripartum hysterectomy increased significantly from 5.4% to 46.5%.³⁹

In the present study, majority of the patients had no morbidity (94.04%). While, 22 (9.36%) patients had morbidity. Of 22 patients with morbidity, majority required wound re-suturing (N=9) and blood transfusion for haemorrhage (N=9) followed by atonic uterus, haemorrhage + hysterectomy, haemorrhage + blood transfusion + Atonic uterus, and haemorrhage + blood transfusion + hysterectomy in 1 patient each. Similar to the present study, **Bizuneh et al.** found that following emergency caesarean section, majority of mothers (94.8%) had smooth post-operative course during the hospital stay. However, the rest of mothers (5.2%) had developed post-operative complications. The causes of morbidity were surgical site wound infection (63.0%), pulmonary disease

(25.0%), anaemia and multi system involvement.¹⁵ Similarly, **Ali et al.** reported an overall morbidity rate of 20%. The causes of morbidity were wound infection (27.1%), sepsis (21.4%), endometritis (33.3%), haemorrhage (8%) and wound dehiscence.²⁹ In a study by **Santhanalakshmi et al.**, the commonest complication was wound infection (38%). The next common complications were UTI, post-operative fever and spinal headache, 20%, 19%, and 14.4% respectively.³⁹ A retrospective cohort study, **Fesseha et al.** reported high post-operative maternal morbidity including increased blood loss (14%), uterine incision extension (8%), atonic PPH (8%), prolonged bladder catheterization (38%), wound infection (16%) and postpartum fever (12%).⁴⁰ The lower figure of post caesarean section, maternal complication in the study by **Hager et al.** can be explained by the increasing national ANC coverage and early treatment of the maternal co morbidities and increased quality of intra-operative and post-operative care and use of prophylactic antibiotics and blood transfusion.⁴¹

11. Maternal Mortality

Caesarean delivery is associated with a significantly increased risk of maternal death from complications of anaesthesia, puerperal infection, and venous thromboembolism. However, the risk of death from postpartum haemorrhage does not differ significantly between vaginal and caesarean deliveries.⁴¹ In the present study, none of the 235 mothers died. Similarly, there was no maternal mortality in the studies by **Bizuneh et al.**¹⁵ and **Das et al.**¹⁶ This is similar to the study reported by **Ali et al.**, which demonstrated no maternal death.²⁹

There are other studies illustrating, high survival rates of mothers following both emergency and elective caesarean sections. Another prospective observational study by **Fenton et al.**, involving 8070 caesarean sections in Malawi, reported the maternal Mortality rate of less than 1%.⁴² Some of the reasons responsible for the increasing survival rate is the increasing safety of the procedure due to antibiotics; availability of blood transfusions; better anaesthesia and the physicians' high intent to deliver a healthy or undamaged baby and leave a healthy mother, when done for complications occurring during pregnancy and labour.⁹

On the other hand, a study conducted by **Tadesse et al.**, reported, that out of 318 caesarean sections, there were five (1.5%) maternal deaths. The main cause of maternal death was failure to control bleeding during the caesarean section. It was suggested that these were preventable deaths in experienced hands.⁴³ Thus, good antenatal and postnatal care is required to prevent maternal mortality.

12. Length Of Hospital Stay

In the present study, majority of the patients were hospitalised for ≤5 days (80%) followed by 6 – 10 days (11.49%). The length of hospital stay ranged from 4 to 27 days with a mean of 5.34 ± 3.02 days. Time spent in hospital varied with indication; women whose indication was failed induction, multiple pregnancy, and severe hypertensive disease were stayed the longest (>8 days). Regarding the duration of hospital stay post operatively, different studies show that compared to the elective caesarean section extended hospital stay is found more in emergency caesarean section group. This is due to the increased post-operative morbidity associated with emergency caesarean section than the elective caesarean section.⁴⁴

Post-operatively, in a study by **Bizuneh et al.**, majority (84.1%) of women remained in hospital for 4 days or fewer, and 55 (10.5%) stayed for 5-8 days, 25 (4.8%) last >8 days and about 3 (0.6%) were not documented. Post-operative complications tend to be more frequent in those mothers, who had no disease than those who had illness, and severe hydrate, prolonged

rupture of membranes and post-term were those whose high percent of them stayed the shortest (< 5 days).¹⁵

A national review of caesarean section rate in Ethiopia in 2008 demonstrated that in total 26% of women remained in hospital for 3 days or fewer, and 65% stayed for 4-8 days women whose indication was CPD stayed the longest (6.8 days on average) and those who were HIV-positive stayed the shortest (3 days). The mean duration was 5.9 days.⁴⁰ In comparison to this report, duration of hospital stay was shorter in the present study, which may be explained by the above stated lower post-operative complications.

CONCLUSIONS

This prospective, observational, single centre study involved 235 adult patients with low-risk pregnancy that underwent emergency caesarean section. In all the patients, maternal morbidity and mortality was evaluated and following conclusions were drawn:

- Patients predominantly belonged to the age group of 26 – 30 years (41.28%) and mean age of the study population was 25.98 ± 3.82 years.
- Majority of the patients were booked (65.53%) and resided in urban areas (57.45%).
- Most of the patients were multipara (60%), while remaining were primipara (40%).
- Emergency caesarean section was most commonly indicated for foetal distress (42.13%).
- Most of the neonates had good general condition (97.46%) and normal birth weight (80.93%).
- Only 1.69% low-risk pregnancies had intrauterine deaths.
- Of all newborns, 2.54% required NICU admission and 2.12% died.
- Majority of the patients had no morbidity (94.04%).
- Of patients with morbidity (9.36%), wound re-suturing and blood transfusion for haemorrhage were most frequently observed.
- Most of the patients were hospitalised for ≤ 5 days (80%) and the mean length of hospital stay for the study population was 5.34 ± 3.02 days.
- Finally, none of the patients died.

Thus, the findings of the study suggest that emergency caesarean section can be safely performed in women with low-risk pregnancy with careful selection of patients and proper indication for lscs. This study is to highlight the fact that caesarean sections done as an emergency for any indication has its share of problems to the mother and hence caution must be exerted in proper planning of the cases. Further audits are mandatory to study the present indications for emergency caesarean sections and avoid any unplanned interventions. Moreover, low-risk nature of pregnancy could be the reason for absence of maternal mortality.

REFERENCES:

1. Gurunule AA, Warke HS. Maternal and foetal outcome in elective versus emergency caesarean sections. *Int J Reprod Contracept Obstet Gynecol* 2017;6:1222-8.
2. Leonard SA, Main EK, Carmichael SL. The contribution of maternal characteristics and caesarean delivery to an increasing trend of severe maternal morbidity. *BMC Pregnancy Childbirth* 2019;19:16.
3. Betran AP, Ye J, Moller A-B, et al. Trends and projections of caesarean section rates: global and regional estimates. *BMJ Global Health* 2021;6:e005671.
4. Roy A, Paul P, Chouhan P, Rahaman M, Kapasia N. Geographical variability and factors associated with caesarean section delivery in India: a comparative assessment of Bihar and Tamil Nadu. *BMC Public Health*. 2021;21(1):1715.
5. Singh P, Hashmi G, Swain PK. High prevalence of caesarean section births in private sector health facilities- analysis of district level household survey-4 (DLHS-4) of India. *BMC Public Health*. 2018;18(1):613.
6. Zandvakili F, Rezaie M, Shahoei R, Roshani D. Maternal Outcomes Associated with Caesarean versus Vaginal Delivery. *J Clin Diagn Res*. 2017;11(7):QC01-QC04.
7. Venturella R, Quaresima P, Miceli M, Rania E, Palumbo A, Visconti F, et al. Non-obstetrical indications for caesarean section: a state-of-the-art review. *Arch Gynecol Obstet*. 2018;298(1):9-16.
8. Althabe F, Sosa C, Belizan JM, Gibbons L, Jacquerioz F, Bergel E. Caesarean section rates and maternal and neonatal mortality in low-, medium-, and high-income countries: an ecological study. *Birth*. 2006;33(4):270-77.
9. Pallasmaa N, Ekblad U, Gissler M. Severe maternal morbidity and the mode

- of delivery. *Acta Obstetrics Gynecology Scandinavia*. 2008;87(6):662-68.
10. Alsammani MA, Nasralla K, Khieri SA, Saadia Z, Shaeldin MA, Ali AO. Intrapartum Fetal and Maternal Complications in Low-Risk Pregnancy: Experience of a Tertiary Hospital in Low-Income Countries. *Open Access Maced J Med Sci*. 2019;7(12):1979-1983.
11. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY. *Williams Obstetrics*, 23rd edn. Chapter 25. Caesarean Delivery and Peripartum Hysterectomy. McGraw Hill, New York; 2010:544-55.
12. Verdult R. Caesarean birth: psychological aspects in adults. *Int. J. of prenatal and perinatal psychology and medicine* 2009;21(1):17-36.
13. Stanton C, Ronsmans C. Recommendations for routine reporting on indications for caesarean delivery in developing countries. *Birth*. 2008;35:204-11
14. Signh G, Gupta ED. Rising incidence of caesarean section in rural area in Haryana, India: a retrospective analysis. *Internet J Gynecol Obet*. 2013;17(2):1-5.
15. Bizuneh A, Ayana G. Indications and Outcomes of Emergency Caesarean Section at St Paul's Hospital Medical College, Addis Ababa, Ethiopia 2017: (Afoul Month Retrospective Cohort Study). *Invest Gynecol Res Women's Health*. 2018;2(2):133-147.
16. Das RK, Subudhi KT, Mohanty RK. The rate and indication of caesarean section in a tertiary care teaching hospital eastern India. *Int J Contemp Pediatr*. 2018;5(5):1733-9.
17. Jawa A, Garg S, Tater A, Sharma U. Indications and rates of lower segment caesarean section at tertiary care hospital-an analytical study. *Int J Reprod Contracept Obstet Gynecol*. 2016;5:3466-9.
18. Sarma P, Boro RC, Acharjee PS. An analysis of indications of caesarean sections at Tezpur medical college and hospital, Tezpur (a government hospital). *Int J Reprod Contracept Obstet Gynecol*. 2016;5:1364-7.
19. WHO. Rates of caesarean section analysis of global, regional and national estimates. *Paediatr Perinat Epidemiol*. 2007;21(2):98-113.
20. Lulu A, Noam A. Outcome in elective and emergency caesarean sections: a comparative study. *Annals of Saudi Medicine* 1996;6(6):645-649.
21. Okezie A. A 4-year analysis of caesarean delivery in a Nigerian teaching hospital: one-quarter of babies born surgically. *Annals of African Medicine* 2004;3:82-93.
22. Green JE, Meclean F, Usher SR. Caesarean section study of latin American Hospital. *Am J obstet Gynaecol*. 1982;142.
23. Kim SY, Park JY, Bak SE, Jang YR, Wie JH, Ko HS, et al. Effect of maternal age on emergency cesarean section. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2020;33(23):3969-3976.
24. Hordofa G, Ashenafi S. Caesarean section and associated factors at MizanAman General Hospital Southwest Ethiopia. *Journal of Gynecology and Obstetrics* 2014;2(3):37-41.
25. Renuka PA, Suguna V. Comparative study of maternal and foetal outcomes in patients undergoing elective or emergency Caesarean section. *J Med Sci Clin Res*. 2016;4(12):15059-69.
26. Kambo I, Bedi N, Dhillon BS, Saxena NC. A critical appraisal of cesarean section rates at teaching hospitals in India. *International journal of gynecology & obstetrics*. 2002;79(2):151-8.
27. Jain U. The rates and indications of caesarean section in district Hospital Shivpuri: A retrospective study from Madhya Pradesh. *International Journal of Medical and Health Research*. 2018;4(3):113-116.
28. Gao Y, Qin X, Gang C, Peter S, Min Z, et al. Analysis of indications of c/s in teaching Hospitals of china. *European Journal of Obstetrics and Gynaecology and Reproductive Biology* 2013;170:414-418.
29. Ali Y. Analysis of caesarean delivery in Jimma Hospital, South western Ethiopia. *East Afr Med J* 1995;72(1):60-63.
30. Hofmeyr GJ, Barrett JF, Crowther CA. Planned caesarean section for women with a twin pregnancy. *Cochrane Database of Systematic Reviews*. 2015(12).
31. Obiechina NJ, Okolie VE, Eleje GU, Okechukwu ZC, Anemeje OA. Twin versus singleton pregnancies: the incidence, pregnancy complications, and obstetric outcomes in a Nigerian tertiary hospital. *International journal of women's health*. 2011;3:227.
32. Poma PA. Correlation of birth weights with caesarean rates. *International Journal of Gynaecology & Obstetrics*. 1999;65(2):117-23.
33. Hemant D, Madhukar S, Bhushan C, Shruti S, Alisha D. Comparative Study of Maternal and Perinatal Morbidities in Elective Caesarean section and Emergency Caesarean Section in a Tertiary Care Centre. *Gynecologist*. 2021;3(1):1019.
34. Yee W, Amin H, Wood S. Elective cesarean delivery, neonatal intensive care unit admission, and neonatal respiratory distress. *Obstetrics & Gynecology*. 2008;111(4):823-8.
35. Khasawneh W, Obeidat N, Yusef D, et al. The impact of cesarean section on neonatal outcomes at a university-based tertiary hospital in Jordan. *BMC Pregnancy Childbirth* 2020;20:335.
36. Kamath BD, Todd JK, Glazner JE, Lezotte D, Lynch AM. Neonatal outcomes after elective cesarean delivery. *Obstetrics and gynecology*. 2009;113(6):1231.
37. MacDorman MF, Declercq E, Menacker F, Malloy MH. Infant and neonatal mortality for primary cesarean and vaginal births to women with "no indicated risk", United States, 1998-2001 birth cohorts. *Birth* 2006;33:175-82.
38. Shah A, Fawole B, Mimunya JM, Amokrane F, Nafiu I, Wolombi JJ, et al. Caesarean delivery outcomes from the WHO global survey on maternal and perinatal health in Africa. *International Journal of Gynecology & Obstetrics*. 2009;107(3):191-7.
39. Santhanalakshmi C, Gnanasekaran V, Chakravarthy AR. A retrospective analysis of caesarean section in a tertiary care hospital. *Int J Sci Res*. 2015;4:2097-9.
40. Fesseha N, Getachew A, Hilul M, Gebrehiwot Y, Bailey P. A national review of caesarean, delivery in Ethiopia. *International Journal of Gynecology and Obstetrics* 2011;115(1):106-111.
41. Häger RM, Daltveit AK, Hofoss D, Nilsen ST, Kolaas T, Øian P, et al. Complications of cesarean deliveries: rates and risk factors. *American journal of obstetrics and gynecology*. 2004;190(2):428-34.
42. Fenton PM, Whitty CJ, Reynolds F. Caesarean section in Malawi: prospective study of early maternal and perinatal mortality. *BMJ*. 2003;327(7415):587.
43. Tadesse E, Adane M, Abiyu M. Caesarean section deliveries at Tikur Anbessa Teaching Hospital, Ethiopia. *Ethiop J Health Dev* 2003;2(3):37-41.
44. Geidam AD, Audu BM, Kawuwa BM, Obed JY. Rising trend and indications of caesarean at Maiduguri hospital Nigeria. *Ann Afr Med* 2009;8(2):127-132.