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Original Article

Maternal Morbidity and Mortality Trends in Relation to the Number of Previous Cesarean Sections — A Clinical Study

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ABSTRACT

Introduction: *Cesarean section (C/S) is a common surgical procedure used to deliver a baby through an abdominal and uterine incision. While it can be life-saving for both mother and baby, repeat cesarean sections are associated with increased maternal risks and complications. This study aims to explore the relationship between the number of prior cesarean sections and maternal outcomes, focusing on peri-operative complications and maternal morbidity and mortality.* ***Methods & Materials:*** *This observational cross-sectional study was conducted Department of Obstetrics & Gynaecology, Chittagong Medical College & Hospital, from December 16-June'17. All the pregnant women who underwent repeat Caesarean section in Chittagong Medical College Hospital, Chittagong during the study period were considered as the study population. A total of 100 study subjects were selected by consecutive convenient sampling techniques. Data analysis was done by SPSS (Statistical Package for Social Sciences) 16. In all cases, p value <05 was considered significant.* ***Result:*** *The results indicate that maternal morbidity increases with the number of previous cesarean sections, with higher rates of post-partum hemorrhage, blood transfusion, wound infection, and other complications in women who had two or more cesarean sections, especially in those with three. However, there was no statistically significant association between maternal mortality and the number of previous cesarean sections.* ***Conclusion:*** *The study shows increased maternal morbidity with multiple cesarean sections, especially after three, with higher rates of hemorrhage, transfusions, infections, and visceral injuries. No link was found between prior C-sections and maternal mortality.*

Keywords: *Maternal Morbidity, Mortality, Previous Cesarean Sections*

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INTRODUCTION

A cesarean section (C/S) is defined as the delivery of a baby through an abdominal and uterine incision after the fetus reaches viability [1]. Over the past three decades, the incidence of primary C/S has been rising globally, reaching nearly one-third of all deliveries in some countries [2,3]. This increase is attributed to a variety of factors, though they remain not fully understood [4]. Contributing elements include changes in maternal demographics, variations in medical practice, increasing malpractice concerns, as well as economic, organizational, social, and cultural influences [5,6]. Further concerns surrounding C/S involve disparities in its use between and within countries, as well as the financial burden that unnecessary procedures place on healthcare systems [7,8]. Additionally, advancements in anesthesia, antibiotics, blood product availability, and pre-and post-operative care have contributed to the growing trend of C/S [9,10]. Since 1985, the international healthcare community has advocated for an optimal C/S rate between 10% and 15%, suggesting that rates above this range do not improve pregnancy outcomes [11]. Despite this, the global rate has continued to rise, with significant regional differences [12]. Betrán et al.'s study estimates the global average C/S rate at 18.6%, ranging from 6.0% in less developed regions to 27.2% in more developed areas. Africa has the lowest C/S rates at 7.3%, while South America records the highest at 42.9% [8]. In South-East Asia, C/S rates exhibit a similar trend. Research by Neuman et al. found that institutional delivery rates vary widely, from 21% in rural India to 90% in urban India. In private and charitable facilities, C/S rates are as high as 73% in Bangladesh, 30% in rural Nepal, 18% in urban India, and 5% in rural India, with repeat cesarean sections accounting for 30% of all procedures [13]. While maternal death from C/S is now rare, the short- and long-term effects of the increasing C/S rate on maternal and fetal health remain inconclusive [14,15]. It is also unclear whether the rise in C/S has led to better fetal outcomes [8]. Although C/S is a common life-saving procedure for both mother and baby, it is not without risk. There is ongoing debate about the risks, complications, and benefits of repeat C/S. Maternal complications tend to increase with the number

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of repeat C/S, often due to dense intra-abdominal adhesions and abnormal placentation [16-18]. Unplanned peri-partum hysterectomies are sometimes performed as a last resort to control life-threatening hemorrhage, frequently caused by placenta previa, placenta accreta, uterine atony, or uterine rupture [1,19-20]. Other complications, such as excessive intraoperative bleeding and injury to the bowel and bladder, are also not uncommon. Post-operative issues include wound infections, postpartum hemorrhage, urinary tract infections, and, in rare cases, death [1,20]. This study aimed to evaluate maternal morbidity and mortality trends in relation to the number of previous cesarean sections.

METHODS & MATERIALS

This observational cross-sectional study was conducted Department of Obstetrics & Gynaecology, Chittagong Medical College & Hospital, from December 16-June'17. All the pregnant women who underwent repeat Caesarean section in Chittagong Medical College Hospital, Chittagong during the study period were considered as the study population. A total of 100 study subjects were selected by consecutive convenient sampling techniques. Written informed consent was taken from every patient. Following admission, a physical examination and all routine investigations were performed. As mothers are subject to prone to developing complications they were quickly assessed and made ready for Caesarean section. All the data were checked and edited after collection. Then data were entered in SPSS 16 for the Windows 10 program version. An analysis plan was developed keeping the objectives of the study in mind. Frequency distribution and normal distribution of all continuous variables were calculated and expressed as Mean ± SD. Further associations were done by the chi-square test. In all cases, p-value <05 was considered significant. Ethical clearance was taken from the ethical review committee of the Chittagong Medical College for conducting the study.

Inclusion criteria:

- Pregnant women with gestational age >28 weeks to 40+ weeks with a history of one or more previous Caesarean sections.
- Emergency cases of repeat C/S are included during the study period.
- Patients with co-morbid disease (HTN, Heart disease) are also included.

Exclusion criteria:

- Pregnant women who were unwilling to participate.
- Patients undergoing hysterotomy (Caesarean delivery before 28 weeks of gestation).

RESULTS

Table – I: Socio-demographic profile of study subjects (*n*=100)

Variables	n	%
Age group		
<26	42	42.0
26-30	38	38.0
>30	20	20.0
Residence		
Rural	80	80.0
Urban	20	20.0
Level of Education		
Illiterate	10	10.0
Primary	13	13.0
Upto SSC	21	21.0
SSC	22	22.0
HSC	18	18.0
Graduate and above	16	16.0
Occupation		
Housewife	90	90.0
Service Holder	06	6.0
Business	04	4.0
Income (BDT)		
<10000	19	19.0
10000 to 20000	40	40.0
>20000	41	41.0

The mean age of the population was 26.18±5.01. The maximum age was 37 years and the minimum age was 19 years. 42% of mother had their age less than 25 years. 38% of mothers aged between 26 to 30 years and 20% of patients aged more than 30 years. Among 100 cases majority came from rural areas (80%). The rest of the mothers were staying in urban areas (20%). The majority of the mothers had an education up to SSC (22%). 41% of the patients in this study had a family income of more than 20000 taka. 90% were housewives. [Table I]

Table – II: Obstetric profile of the study subjects (*n*=100)

Variables	n	%
Parity		
One	60	60.0
Two or more	40	40.0
Gravida		
2nd	43	43.0
>2	57	57.0
Gestational age at the time of surgery		
<34 weeks	05	5.0
34 to 36 weeks	20	20.0
37 to 40 weeks	71	71.0
>40 weeks	04	4.0

Out of 100 mothers, 60 had one previous pregnancy, and 57 were gravid for more than 2 times. 43 mothers were gravid for the 2nd time. 71 of the pregnant women in this study had

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gestational age between 37 to 40 weeks at presentation. 20 mothers had gestational age between 34 to 36 weeks. 5 pregnant women had <34 weeks and 4 had more than 40 weeks of gestational age. See Table 2 for details. [Table II]

Table – III: Distribution of study population according to the number of previous history of caesarian section (*n*=100)

Number of cesarean sections	n	%
One	69	69.0
Two	24	24.0
Three	07	7.0

69% of mothers had a previous history of one caesarian section. 24% of mothers had two and 7% had three previous caesarian sections. [Table III]

Table – IV: Past medical history of study subjects (*n*=57)

Past Medical History	n	%
Hypertension	09	9.0
Diabetes Mellitus	20	20.0
Hypothyroidism	6	6.0
Bronchial Asthma	9	9.0
Heart disease	2	2.0
HTN + DM	5	5.0
DM + Hypothyroidism	6	6.0
Total	57	57.0

57% of pregnant women had a significant history of previous medical illness. 20% had a history of diabetes mellitus, 9% had HTN, another 9% had Bronchial Asthma, 6% had hypothyroidism and 2% patients had heart disease. A total of 11 women had two diseases; 5 women had DM with HTN and 6 women had DM with Hypothyroidism. [Table IV]

Table – V: Past obstetric history of study subjects (*n*=26)

Past Obstetric History	n	%
Pregnancy-induced hypertension	7	7.0
Miscarriage	5	5.0
Antepartum haemorrhage	5	5.0
Preterm delivery	5	5.0
Intrauterine death	4	4.0
Total	26	4.0

26 patients had significant past obstetric history, 7% had a history of pregnancy-induced hypertension, 5% had a history of miscarriage, another 5% had a history of antepartum hemorrhage, 5% had a history of preterm delivery and 4% patients had a history of inter-uterine death. [Table V]

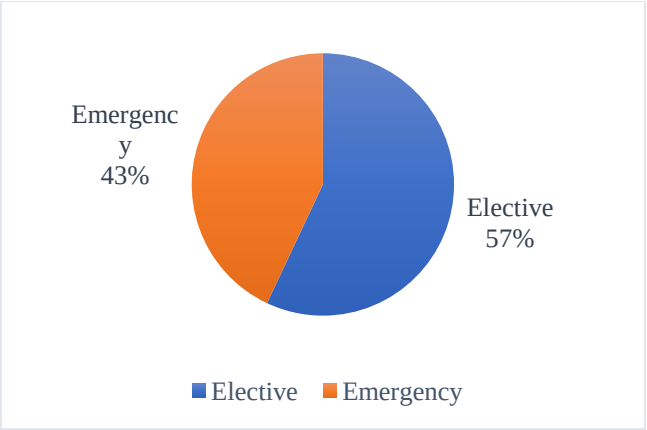

Figure – 2: Distribution of subjects according to the type of Caesarian section (*n*=100)

57% had undergone elective C/S and 43% had undergone emergency C/S. Figure 2 shows a pie chart of the distribution.

Table – VI: Distribution of patients according to indication of repeated Caesarian Section (*n*=100)

Indication of repeated caesarian section	n	%
H/O At Least 2 Previous C/S or More	31	31.0
Fetal Distress	30	30.0
PROM	11	11.0
Placenta Previa	3	3.0
Breech Presentation	6	6.0
Severe PE	5	5.0
Ante Partum Haemorrhage	4	4.0
Intra-Uterine Growth Retardation	2	2.0
Eclampsia	2	2.0
Heart Disease	2	2.0
Cephalo-Pelvic Disproportion	2	2.0
Shoulder Presentation	1	1.0

The most common indication for the repeated caesarian section was a history of 2 or more C/S (31% of patients). The second common indication was fetal distress (30% of patients). [Table VI]

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Table – VII: Relationship of maternal morbidity and mortality with history of caesarian section (*n*=100)

Maternal Morbidity*	History of Caesarian Section					
	One n=69		Two n=24		Three n=7	
	n	%	n	%	n	%
Post-partum Hemorrhage	2	2.90	1	4.20	1	14.30
Blood transfusion required	3	4.30	4	16.66	3	42.85
Per-operative Visceral Injury	0	0.0	2	8.33	0	0.00
Wound Infection	1	1.40	9	37.5	3	42.90
Endometritis	4	5.79	1	4.20	0	0.00
Hysterectomy	0	0.0	2	2.90	0	0.00
None	59	85.51	5	20.83	0	0.00
Maternal Mortality**						
Alive	69	100	23	95.8	7	100.0
Died	0	0	1	4.2	1	14.3
Chi-square test was done *p-value of <0.001 **p-value 0.662						

Significantly high maternal complications were noted in pregnant women who had a history of more than one caesarian section and the number was still higher in patients who had 3 previous histories of C/S. No significant relationship between maternal mortality and the previous number of C/S was noted. [Table VII]

DISCUSSION

The mean age of the women was 26.18 +5.01. The maximum age was 37 years and the minimum age was 19 years. 42% of mother had their age less than 25 years. 38% of patients were aged between 26 to 30 years and 20% of mothers were aged more than 30 years. The findings are similar to the findings by Nahar K et al. [21]. However different findings are noted in multiple studies like Ghazala A et al. and Sobande A et al. [22, 23]. This could be probably due to geographical variation and cultural effects of marriage and childbearing. Out of 100 women, 60 mothers had one previous pregnancy. 40 mothers had two or more previous childbirth and 57 were gravid for more than 2 times. Nahar K et al. showed that all of the study subjects were multigravida [21]. Among the study group, 69 patients had a previous history of one caesarian section, 24% of patients had two, and 7% of patients had three previous caesarian sections. Nahar K et al. showed 88% of patients had one & 12% had two previous sections [21]. A study by Ghazala A. et al. evidenced that 157 had undergone two previous C/Ss, 49 women had three previous C/Ss, 16 with four previous C/Ss, and 2 with five previous C/Ss among 224 women [22]. Juntunen K et al. also reported the highest number of repeated cesarean sections (4-10) [24]. These variations can be explained by the geographical variations of contraceptive programs and cultural practices. During the initial presentation, 60% of women had an illness alongside and/or associated with pregnancy. Among them 21% had tenderness over previous C/S scar, 12% had gestational diabetes mellitus, 9% patients had pregnancy-induced hypertension, 7% patients had premature rupture of membrane, 5% had severe pre-eclampsia, 2% had eclampsia, 2% had severe oligohydramnios and another 2% had polyhydramnios. The result is slightly different from another study. Nahar K et al, showed that in around half (48%) of the cases, the antepartum period was uneventful [21]. Another 16% of cases had some complications related to previous surgery like placenta praevia, and scar tenderness & all of the study population had undergone repeated caesarian section (C/S). Among 100 C/S cases, 57 had undergone elective C/S, and 43 had undergone emergency C/S. This finding is almost similar to the results of the study done by Akhtari K et al. She showed in her study that, 54% of patients had done C/S electively and the rest of them (46%) underwent C/S as an emergency procedure. This similarity poses a hypothesis that repeated cesarean section has imposed the same kind of complications among women irrespective of country [25]. This analysis was focused on exploring the relationship between the development of maternal complications with the number of C/S. Significantly high maternal complications were noted in pregnant women who had a history of more than one caesarian section and the number was still higher in patients who had 3 previous histories of C/S. Though maternal morbidity was significantly associated with an increased number of C/S (p-value <.001) no significant relationship between maternal mortality and previous number of C/S was noted. Gazala et al assessed maternal complications separately and showed postpartum hemorrhage was in 6%, and 22% respectively of patients with two, three, four, or more previous C/S groups in the elective subgroup [22]. He described that only one patient had re-laparotomy for postoperative haemoperitoneum and blood transfusion was required in 8%, 6%, and 11% in two, three, and four or more previous C/S groups. There were no significant differences in the rates of bowel injury and cesarean hysterectomy, but the rates of bladder injury and presence of severe adhesions were higher in group 1 than in group 2 (P<0.05). No differences were found in other variables [23].

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

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CONCLUSION

The study highlights a significant increase in maternal morbidity among women with a history of more than one cesarean section, with the highest complication rates seen in those with three previous C-sections. Complications such as postpartum hemorrhage, the need for blood transfusions, wound infections, and per-operative visceral injuries were notably more common in these groups. However, no statistically significant relationship was found between the number of prior cesarean sections and maternal mortality.

RECOMMENDATION

To reduce maternal morbidity in women with multiple prior cesarean sections, it is essential to provide comprehensive preoperative assessments and personalized care plans. Surgical teams should be well-trained to handle complications such as hemorrhage, wound infections, and visceral injuries. Enhanced postoperative monitoring is crucial for the early detection of issues, and patient education on the risks of repeat C-sections should be prioritized.

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Conflict of interest: None declared

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

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