Original Article

Maternal and Fetal Characteristics to Predict Caesarian Section Delivery

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Abstract

Objectives: To assess maternal and fetal characteristics to predict caesarian section delivery.

Methodology: This Prospective Cohort study was conducted in department of Obstetrics & Gynecology, Aziz Fatimah Medical and Dental College and Hospital, Faisalabad, from October 2020 to October 2021.

Pregnant women of age between 18-40 years, having single tone pregnancy, visiting for delivery were included in the study. At the time of enrollment demographic information including maternal age, maternal education, pregnancy history, body mass index, gravidity, parity, history of C-section, comorbid disease, and preterm (< 37 weeks) delivery, were assessed. All the women were divided into two groups based on delivery one was normal delivery group and second was caesarian delivery. Deliveries with or without induction, spontaneous deliveries, vacuum extraction or forceps delivery were considered as vaginal delivery. The fetal outcomes like birth weight and requirement of NICU admission was also noted.

Results: In this study, 38 (22.2%) women deliver with caesarian section. The mean age was significantly higher in caesarian section group (33.51 ± 2.1 vs 29.5 ± 2.3, P-value = 0.000) as compared to women in vaginal delivery group. The main contributing factors which can significantly enhance the chance of caesarian section delivery are maternal age (OR =1.26), preterm delivery (OR=1.52), comorbid disease (OR=1.59), no history of vaginal delivery (OR=1.98) and history of caesarian section (OR=6.46), birth weight of the baby (OR=1.48 for < 2.5kg, and OR=2.06 for >3.5 kg) and requirement of NICU admission (OR=1.86).

Conclusion: Higher maternal age (> 35 years), comorbid disease, preterm delivery (< 37 weeks), no history of vaginal delivery, history of previous c-section, obstetrical complications, birthweight of (< 2500 g) and (⩾ 3500 g), and requirement of NICU admission were found to be main significant contributing factors for c-section.

Key Words: Feto-maternal factors, Cesarean section, Maternal age,

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Introduction

During labour, many nulliparous women have emergency obstetric operations, such as surgical vaginal delivery and caesarean delivery (CD). However, there is no effective method for determining which women will have the most difficulty giving birth. For both women and obstetricians, this can be frustrating and unsatisfactory. Because CD in advanced labour has a higher morbidity (and death)

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than an elective pre-labor CD, the problem is critical.[1]

Professional organizations and government agencies have been focusing on eliminating CD by enacting policies that encourage vaginal birth, with little regard for the ramifications of these recommendations. The identification of women at risk can help obstetricians and midwives to offer elective procedure and predict which women will require operational delivery. This documentation of risk can also help to segregate the women with limited risk which can be encouraged to opt for vaginal delivery.[2,3]

In both rich and developing countries, the rate of caesarean section (CS) has risen dramatically in recent decades. Cesarean deliveries have more than doubled from the first decade of the twenty-first century, from 8% to 17% of all deliveries in the second decade. According to the World Health Organization, caesarean deliveries should not account for more than 10% to 15% of all deliveries in any country. 4, Although caesarean birth can save a woman's life, it should only be done when medically necessary, as complications that have negative effects on the mother's and newborn's mortality and morbidity have been widely documented in the literature. Childhood obesity, respiratory diseases, type 1 diabetes, acute lymphoblastic leukaemia, delayed cognitive development, greater rates of autism, and an increased risk of neurodevelopmental disorders are some of the bad health consequences in infants born via caesarean section.[5,6]

Many factors can contribute to a caesarean delivery, such as the likelihood of a caesarean delivery increasing with maternal age. Women between the ages of 25 and 29 had the lowest CS rate, whereas pregnant women aged 35 years or older had the greatest CS rate. All possible factors include dread of pain during childbirth, avoidance of pelvic floor collapse and incontinence after vaginal delivery, and previous poor birth experience. [7,8]

Obesity in mothers is linked to obstetric difficulties that can lead to a caesarean delivery, and several studies have found an obesity–caesarean link. The CS rate was greater in multiparous women than in primiparous women. It's possible that the cause is repeated CS. The risk of caesarian section delivery increases with male gender of infant as compared to female gender.9 The main reason of this may be the perinatal complications which are associated with male gender. These complications consist of maternal gestational diabetes, preterm delivery, macrosomia, fetal distress, and failure of progress during first and second stage of labor, cord knots, cord prolapse, placenta abruption and placenta praevia.[10]

Poor awareness of the early symptoms of obstetrical problems contributes to late consultation with obstetricians in underdeveloped nations. This could cause the C-section to be postponed, putting the baby's life at stake. As a result, maternal and fetal outcomes may be improved by identifying and recognizing risk factors for C-section. As a result, the goal of this study is to evaluate the maternal and fetal risk factors that may necessitate a C-section. As a result, mothers and families, particularly in the third trimester, as well as health practitioners, can make the required preparations.

Methodology

In this Prospective Cohort Study, all the booked and non-booked patients visiting to the department of Obstetrics & Gynecology, Aziz Fatimah Medical and Dental College and Hospital, Faisalabad, for normal or caesarian delivery through elective or emergency caesarian section were included. The study was conducted in a period of one year from October 2020 to October 2021. After receiving approval from the hospital ethical review committee, the data collection procedure for this study begun. Patients who satisfied our criteria were enrolled using a nonprobability consecutive sampling procedure. The study protocol was explained to all of the participants who were chosen for the study, and the researcher obtained their informed written consent. The confidentiality of their medical and non-medical information was respected. A total of 171 women were included in the study. The sample size was calculated by WHO sample size calculator based on 95% confidence interval, 20% rate of caesarian section[11] and 6% absolute precision level.

Pregnant women of age between 18-40 years, having single tone pregnancy, visiting for normal or planned or emergency caesarian section delivery were included in the study. Pregnancies with ruptured membrane, fetal anomaly, or fetal demise, were excluded from the study.

At the time of enrollment demographic information including maternal age, maternal education, pregnancy history, body mass index, gravidity, parity, history of pelvic surgery, comorbid disease like diabetes mellitus, GDM, PIH, IUGR, PROM and preterm (< 37 weeks)

delivery, were assessed and recorded. All the women were divided into two groups based on delivery one was normal delivery group and second was caesarian delivery. Vaginal delivery included spontaneous delivery, with or without induction, vacuum extraction, or forceps delivery. The fetal outcomes like birth weight and requirement of NICU admission was also noted. All this information was documented on a predesigned performa.

For analysis, all of the data was entered into SPSS v. 25. Quantitative factors were expressed as mean and standard deviation, whereas qualitative variables were expressed as frequency and percentages. The Chi-square test was used to compare qualitative data between the two groups, whereas the independent sample t-test was used to examine quantitative data. Significant was defined as a P-value of less than 0.05.

Results

In this study a total of 171 women were included from which 38 (22.2%) deliver with caesarian section and 138 (77.8%) deliver vaginally. The demographic and other characteristics were presented in table I that showed that the mean age was significantly higher in caesarian section group (33.51 ± 2.1 vs 29.5 ± 2.3, P-value = 0.000) as compared to women in vaginal delivery group. Most of the women 18 (47.37%) in caesarian group belonged to 30-35 years age interval and in vaginal delivery group majority 57 (42.86%) of the women were in < 30 years age interval. According to most 22 (57.89%) of the women in caesarian section group delivered prematurely as preterm as compared to 59 (44.36%) women in vaginal delivery group. But this difference was not statistically significant (P-value > 0.05). There was no significant difference in both groups based on BMI of the patients. The rate of comorbid diseases was bit higher 10 (26.32%) in women in caesarian section group as compared to 20 (15.04%) in vaginal delivery group but this difference was not statistically significant (P-value > 0.05). Previous vaginal delivery showed no significant (P-value > 0.05) association with caesarian section rate. Based on results the chance of caesarian section rate are highly significantly increased with previous history of caesarian section. The rate of caesarian section was noted to be 16 (42.11%) women in caesarian section group as compared to 8 (6.01%) women in vaginal delivery group with (P-value < 0.001). The birth weight showed very high association with mode of delivery, and it was observed that higher birth weight had a significant (P-value < 0.001) association with caesarian section delivery. The requirement of NICU admission was also significantly (P-value < 0.05) higher in caesarian section group (31.57% vs. 8.27%, P-value < 0.05) as compared to vaginal delivery group as elaborated in table I.

Table I: Distribution of Demographic Variables of the Study Sample

Characteristics	Caesarian Section (n = 38)	Vaginal Delivery (n = 133)	P-value
Maternal age			
Mean ± SD	33.51 ± 2.1	29.5 ± 2.3	0.000**
< 30 years	9 (23.68%)	57 (42.86%)	0.081
30 - 35 years	18 (47.37%)	52 (39.10%)	
> 35 years	11 (28.95%)	24 (18.04%)	
Preterm Delivery			
Yes	22 (57.89%)	59 (44.36%)	0.141
No	16 (42.11%)	74 (55.64%)	
Maternal Body Mass Index (BMI)			
Under Weight	3 (7.89%)	23 (17.29%)	0.407
Normal Weight	14 (36.84%)	52 (39.10%)	
Over Weight	6 (15.78%)	20 (15.04%)	
Obese	15 (39.47%)	38 (28.57%)	
Comorbid Disease			
Yes	10 (26.32%)	20 (15.04%)	0.107
No	28 (73.68%)	113 (84.96%)	
No history of Vaginal Delivery			
Yes	14 (36.84%)	70 (52.63%)	0.086
No	24 (63.16%)	63 (47.37%)	
Previous Caesarian Delivery			
Yes	16 (42.11%)	8 (6.01%)	0.000**
No	22 (57.89%)	125 (93.99%)	
Birth Weight			
< 2500 grams	4 (10.53%)	6 (4.51%)	0.000**
2500-3500 grams	21 (55.26%)	116 (87.22%)	
> 3500 grams	13 (34.21%)	11 (8.27%)	
NICU Admission			
Yes	12 (31.57%)	20 (8.27%)	0.021*
No	26 (68.42%)	113 (84.96%)	

** Significant at 5% level of significance*
*** Highly significant at 1% level of significance*

The univariate logistic regression analysis showed that main contributing factors which can significantly enhance the chance of caesarian section delivery are maternal age, preterm delivery, comorbid disease, no history of vaginal delivery and history of caesarian section, birth weight of the baby and requirement of NICU admission. According to the results maternal age < 30 years plays a protective role for caesarian section as compared to 30 to 35 years age with OR = 0.56 and women having age more than 35 years had a 1.26

times higher chance of caesarian delivery with significant (P-value < 0.05) OR = 1.26. The preterm delivery has 1.52 times higher chances of caesarian section in comparison to term deliveries with OR = 1.52 (1.18 - 1.89). Any comorbid disease like diabetes mellitus, hypertension or GDM increase the chance of caesarian section delivery to 1.59 times as compared to women without any comorbidity. No history of vaginal delivery also increases the chance of caesarian delivery to 1.98 times with OR = 1.98 (1.38 - 2.26).

Previous caesarian section delivery was observed as highest contributing factor for caesarian section with 6.46 time's higher chance of caesarian delivery after previous caesarian section delivery. The chance of caesarian section increases in women having low birth weight babies by 1.48 times and 2.06 time in women having babies having > 3500 grams birth weight as compared to babies having 2500 to 3500 grams of birth weight. The NICU admission requirement was also found significant (P-value < 0.05) contributing factor for caesarian delivery with OR = 1.86 (1.35 - 2.23) as elaborated in table II.

Discussion

Despite significant regional diversity in rates and trends throughout time, with rates dropping in some of the world's most populous cities, the global yearly rate of caesarean section (CS) has climbed. This rate has reached 34.9 percent in China, which is equivalent to that in the United States but more than twice as high as the World Health Organization's recommended range of 10–15%.[12] This also brings with it a bundle of negative maternal and foetal effects brought on by CS. As a result, CS should only be used when there are clear medical indications. However, we must acknowledge that CS is a valuable tool for treating medical and surgical dystocia issues as well as severe pregnancy difficulties. If a pregnant woman experiences aberrant conditions during vaginal birth, such as foetal distress, eclampsia, or severe pre-eclampsia, emergency CS (EmCS) can save her life. According to reports, during vaginal delivery, approximately 14.9% of all deliveries are transferred to EmCS for indicated reasons. [13,14]

The global CS rate is increasing, and medically unwarranted CSs are common. Maternal obesity is on the rise, as is the use of assisted reproductive technology, as well as cultural and socioeconomic influences. However, there are rare exceptions, such as when a vaginal birth attempt fails, and the mother requires EmCS to terminate the pregnancy. To protect the safety of mothers and newborns, it is critical to identify these mothers and conduct emergency surgery as soon as possible.[15,16]

In this study, a total of 171 women were included, of whom 38 (22.2%) delivered by caesarian section and 138 (77.8%) delivered vaginally. These findings are consistent with previous research, such as data from demographic and health surveys (1990-2018) showing a caesarian section rate of 19.6% in 2018 and an Ethopian study showing a CS delivery rate of 25.4%.[17,18]

According to the results of this present study it was noted that maternal age < 30 years plays a protective role for caesarian section as compared to 30 to 35 years age with OR = 0.56 and women having age more than 35 years had a 1.26 times higher chance of caesarian delivery. The finding is similar with literature showing a strong association of maternal age over 35 years with C-section, like in a study by Janoudi it was found that CS rates increased with maternal age, with

Table II: Results of Univariate Logistic Regression

Characteristics	Caesarian Section (n = 38)	Vaginal Delivery (n = 133)	OR (95% CI)	P-value
Maternal age				
< 30 years	9 (23.68%)	57 (42.86%)	0.56 (0.45 - 1.24)	0.000
30 - 35 years	18 (47.37%)	52 (39.10%)	(Reference Category)	
> 35 years	11 (28.95%)	24 (18.04%)	1.26 (1.03 - 1.48)	0.012
Preterm Delivery	22 (57.89%)	59 (44.36%)	1.52 (1.18 - 1.89)	0.005
Comorbid Disease	10 (26.32%)	20 (15.04%)	1.59 (1.18 - 1.97)	0.000
No history of Vaginal Delivery	14 (36.84%)	8 (6.01%)	1.98 (1.38 - 2.26)	0.000
Previous Caesarian Delivery	16 (42.11%)	8 (6.01%)	6.46 (5.62 - 10.36)	0.000
Birth Weight				
< 2500 grams	4 (10.53%)	6 (4.51%)	1.48 (1.09 - 2.02)	0.003
2500-3500 grams	21 (55.26%)	116 (87.22%)	(Reference Category)	
> 3500 grams	13 (34.21%)	11 (8.27%)	2.06 (1.34 -2.36)	0.026
NICU Admission	12 (31.57%)	20 (8.27%)	1.86 (1.35 - 2.23)	0.001

rates of 26.2 percent, 35.9%, and 43.1 percent in women aged 20 to 34, 35 to 40, and over 40, respectively.[19]

From the results of this study, it was observed that the preterm delivery has 1.52 times higher chances of caesarian section in comparison to term deliveries with OR = 1.52 (1.18 - 1.89). Any comorbid disease like diabetes mellitus, hypertension or GDM increase the chance of caesarian section delivery to 1.59 times as compared to women without any comorbidity. The results are parallel with previous studies like study by Robson S, discovered that maternal health issues such as diabetes mellitus, gestational diabetes mellitus, and high blood pressure were linked to an elevated risk of CS. The risk of intensive care unit admission after birth increases moderately with all these birth factors, ranging from 50% in preterm delivery to 84% for children requiring ventilator support and 91% for the children who requires admission to intensive care unit after birth.20 Similar results were found in this present study where it was recorded that the chance of caesarian section increases in women having low birth weight babies by 1.48 times and 2.06 time in women with babies having > 3500 grams birth weight as compared to babies having 2500 to 3500 grams of birth weight. The NICU admission requirement was also found significant (P-value < 0.05) contributing factor for caesarian delivery with OR = 1.86 (1.35 - 2.23).

The results of this present study also showed that no history of vaginal delivery also increases the chance of caesarian delivery to 1.98 times, and previous caesarian section delivery was observed as highest contributing factor for caesarian section with 6.46 times higher chance of caesarian delivery after previous caesarian section delivery. These results are very much in agreement with previous studies.[21]

A birth is renowned for its unpredictability for expectant parents, and the path to a safe labour and delivery is frequently complicated by the need for an unanticipated caesarean delivery. The capacity to forecast a simple vaginal birth or the need for an unanticipated caesarean delivery has the potential to help people make better birth decisions. The planned C-section delivery among high-risk mothers has significantly less chance of complications as compared to unplanned C-section delivery during the labor. The identification of high risk women before birth may help to predict, the requirement of intrapartum caesarian delivery and help the women to opt for elective caesarian delivery which will help in significant reduction of related complications.[22]

Conclusion

The independent factors found to be highly associated with C-section delivery, including higher maternal age (> 35 years), comorbid disease, preterm delivery (< 37 weeks), no history of vaginal delivery, history of previous C-section, obstetrical complications, birth weight of (< 2500 g) and (⩾ 3500 g), and requirement of NICU admission. Pregnant women were expected to utilise these measures to determine their risk of a C-section on their own. Mothers, families, and healthcare providers would be encouraged to schedule early consultations with obstetricians and make better preparations for mothers to deliver at hospitals if the chance of C-section was high.

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