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PREDICTORS OF CAESAREAN SECTION: A CROSS-SECTIONAL STUDY BASED ON MULTIVARIATE ANALYSIS

Sharodiya Das 1,
Dilufar Khodjaeva 2
1Student of International Faculty, Tashkent State Medical University, Uzbekistan
E-mail: sharodiya123@gmail.com.
2PhD, Docent of the Department of Obstetrics and Gynecology, Tashkent State Medical University, Uzbekistan
E-mail: xodjaevadilufar@gmail.com.

Abstract

Background: The rate of Caesarean section (CS) has increased everywhere, frequently above recommendations. Predictors for CS are most important to enhance obstetric care and outcomes for the patient.

Objective: To determine the best predictors for caesarean section among obstetric patients according to multivariate logistic regression.

Methods: 40 women admitted for cesarean section at a Tashkent maternity hospital participated. Sociodemographic, clinical, and obstetric data was collected. Logistic regression, both bivariate and multivariate, was used to determine predictors for CS.

Results: CS was done in 22 (55%) of 40 patients. Maternal age >30 years (OR=3.2, p=0.041), previous CS (OR=5.8, p=0.007), non-cephalic presentation (OR=6.1, p=0.012), and failed labor induction (OR=4.6, p=0.018) were the significant independent predictors.

Conclusion: Maternal age, obstetric history, fetal presentation, and labor outcomes significantly influence the probability of CS. Their early determination may allow for individualized perinatal management policies.

Keywords: Caesarean section; predictive factors; obstetric outcomes; cross-sectional study; maternal age; parity; delivery mode; risk factors.

Introduction

Caesarean section (CS) is among the most common operations carried out throughout the world today [9, 16, 14, 20]. While it is a lifesaving procedure when medically necessary, rising CS rates throughout the world—often well over 30%—have created concern for overuse and maternal and neonatal consequences [1, 5, 19]. The World Health Organization recommends CS rates under 10–15% at a population level [2, 7, 15]. The causes for rising CS rates are complex and include changing maternal characteristics, medico-legal factors, and clinical decision-making trends [3, 17]. Predictive modeling and risk stratification are increasingly being used in obstetrics for the prediction of delivery outcomes and decision-making at the clinical level [12, 18]. Identification

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of which sociodemographic and clinical characteristics are associated with CS can lead to early detection, counseling, and resource planning for the management of labor [8, 10, 13]. The objective of this research was to create predictors of CS among obstetric patients using multivariate logistic regression, and to establish the strength of association between the different clinical factors and operative delivery necessity [4, 6, 11].

Methods

Study Design: The cross-sectional study was conducted between January and March 2025 at a maternity hospital in Tashkent city. Institutional ethics committee permission was obtained, and informed consent was received from participants. We included 40 women who had been admitted for delivery. Inclusion criteria: 18 and 45 years of age. Women who had incomplete records or CS for non-medical reasons were excluded.

Data Collection. A data sheet format was employed to collect data for:

-Demographic features: age, place of residency, level of education, socioeconomic status.

-Pregnancy History: gravidity, parity, cesarean section history, antenatal complications.

-Clinical factors include fetal presentation, induction of labor, labor duration, fetal distress, meconium-stained liquor, and hypertensive disorders, diabetes.

Statistical Analysis. Descriptive statistics yielded summary information for patient characteristics. Bivariate analysis was done using t and chi-square tests. Variables which had $p<0.20$ on bivariate analysis got entered into a multivariate logistic model using backward elimination. Significant statistics included 95% CIs and aOR together with p-values<0.05. Model fit was tested using the Hosmer-Lemeshow test, and predictiveness was measured using the AUC. StataV17 was used for statistical analysis.

Results

The study enrolled 40 pregnant women, 55% (22 women) of whom delivered by caesarean section and 45% (18 women) delivered naturally. Demographic and clinical characteristics and distribution among the study participants based on the two types of deliveries are shown in Table 1.

Table 1. Baseline Characteristics of Study Participants

Variable	Vaginal Delivery (n=18)	Caesarean Section (n=22)	P value
Age >30 years	5 (27.8%)	13 (59.1%)	0.041
Primiparity	6 (33.3%)	14 (63.6%)	0.085
Previous CS	2 (11.1%)	10 (45.5%)	0.007
BMI>30	4 (22.2%)	7 (31.8%)	0.421
Hypertension (chronic/gestational)	4 (22.2%)	6 (27.3%)	0.703
Gestational Diabetes Mellitus	3 (16.7%)	5 (22.7%)	0.603
Preterm birth (<37 weeks)	2 (11.1%)	3 (13.6%)	0.812
Multiple pregnancy	1 (5.6%)	2 (9.1%)	0.673
Anemia	1 (5.6%)	5 (22.7%)	0.603
Non-cephalic Presentation	1 (5.6%)	5 (22.7%)	0.043
Induced Labor	3 (16.7%)	11 (50%)	0.036
Fetal Distress	2 (11.1%)	8 (36.4%)	0.048

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Multivariate Logistic Regression: The final regression model included maternal age, previous CS, non-cephalic presentation, and labor induction. Significant predictors are mentioned in table 2.

Table 2. Multivariate Logistic Regression for Predictors of Caesarean Section

Predictor	Adjusted OR	95% CI	p-value
Age >30 years	3.2	1.1–9.7	0.041
Previous CS	5.8	1.6–20.3	0.007
Non-cephalic Presentation	6.1	1.5–24.8	0.012
Failed Induction	4.6	1.3–17.0	0.018

The Hosmer-Lemeshow test showed an excellent model fit (p=0.68), and AUC was 0.84.

Discussion

Out of 40 women, 55% (22 women) underwent CS and 45% (18 women) had vaginal births. Four independent predictors, which were significantly associated with increased odds for CS, were found through multivariate logistic regression. Maternal age greater than 30 years was also predictive, and women more than 30 years old were more than three times likely to have CS (adjusted OR = 3.2; 95% CI: 1.1–9.7; p=0.041). This finding is both an indicator of physiologic changes due to advanced maternal aging and less vigorous obstetric care for the women over 30 The strongest predictor was a history of CS. Women who had experienced a previous CS had nearly six-fold the chance for repeat CS (adjusted OR = 5.8; 95% CI: 1.6–20.3; p = 0.007), and this could be attributed to clinical judgment and hospital policy that might limit trial of labor after caesarean (TOLAC). Non-cephalic presentation was also an important factor with an adjusted odds ratio of 6.1 (95 CI: 1.5–24.8, p=0.012). Malpresentation as a breech or transverse lie generally excludes safe vaginal birth and necessitates operative delivery, especially when intrapartum monitoring facilities are unavailable. Finally, failed induction was significantly associated with an increased risk for CS (adjusted OR=4.6; 95% CI: 1.3-17.0; p=0.018). This is reflective of an issue with labor progress due to poor cervical favorability or uterine contractility and underscores the importance of close examination before induction. Together, these findings suggest that intrapartum factors and maternal factors present before labor contribute significantly to mode of delivery. Identification of risk factors early is likely to enable personalized treatment protocols, enhance maternal and fetal health, and reduce overall caesarean section rate.

Conclusion

Maternal ages above 30 years, prior history of CS, non-cephalic presentation, and failed induction of labor are independent predictors for CS. All these must be kept in mind during labor planning and counselling to ensure better outcomes and avoid unnecessary CS.

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