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Original Article

Contributing Indications that Provoke C-Section: A Study from Tertiary Care Hospitals

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Abstract

Background: Both cesarean-section (CS) delivery (CD) and vaginal delivery (VD) is associated with well-known measurable short- and long-term maternal and neonatal complications and benefits. **Objective:** The present retrospective observational study was conducted on a preliminary basis to evaluate the contributing factors that provoke CS delivery. **Materials and Methods:** The short-term (6 months) retrospective study was conducted at the Department of Obstetrics and Gynaecology, Pt. Deen Dayal Upadhyay and Northern Railway divisional hospital Moradabad, Uttar Pradesh, India. The sample size was calculated accordingly with a relative precision of 10.2% of prevalence and was found to be 140 and we have taken the sample size of 345. **Results:** The prevalence of CD for a particular course of duration was found to be 36.23%. The risk of CD increased ($P < 0.001$) with increased BMI. However, differential limits of normal BMI signify that lower limit of normal BMI possessed high % of CS. As the education profile was getting high the possibility of CS was found to be increased ($P < 0.001$). Women with negative Rh factor the probability of CS in terms of percentage was found to be 87.5%. There was a proportionate possibility of CS with an increased gap between parities. The % mortality of new-born by CD and VD was 14.28% and 85.71%, respectively, which signifies that CS prevents infant mortality. There was 99.2% possibility of undergoing CS if a woman possessing medical complications. **Conclusion:** The present study acknowledged that CD ensures feto-maternal safety. However, the study also highlighted some probable indications that might engender CD.

Keywords: Body mass index, cesarean delivery, caesarean-section, fetomaternal, mortality, parity, Rh factor, vaginal delivery

Introduction

The cesarean-section (CS) was introduced in clinical practice as a lifesaving procedure both for the mother and the infant.[1] The proportion of CS to the total births is considered as one of the important indicators of emergency obstetric care.[2] The rate of CD has increased dramatically over the past decade. The observation was that in the case of perinatal mortality, there was no benefit of CS for the countries with a high perinatal mortality rate (>20/1000).[3] About 18.5 million CS are performed yearly worldwide and continues to rise in the developed as well as in many developing nations.[4] The rates in many countries have increased beyond the WHO-recommended level of 5%–15%. In high-income as well as low-income countries the rates have gone up phenomenally in the last few decades.[5] In India the average rate was increased from 21.8% to 25.4% with two states, Kerala and Goa, have shown the highest percentage of CS delivery.[6] The rate of CD is relatively much higher in private hospitals rather than in public health facilities.[7]

There was a lack of sufficient evidence to evaluate fully the risk and benefits of planned CD. However, a number of studies have found that cesarean cases at maternal request are actually rare and many personal and societal reasons including fear of labor pain, future sexual dissatisfaction, etc., are behind some reasons.[8] Surgical intervention during pregnancy is usually performed to ensure the safety of the mother and child under conditions of obstetric risks but becomes malpractice.[9]

It is often argued that CS also depends upon the power of decision-making in the home and seeking medicalized health

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care was associated with higher maternal education, family incomes, and women's fear of the physiological consequences of a normal delivery.[10] There are, for instance, practice styles among physicians, or attitudes among obstetricians, fear of litigation, the physician's convenience, and most importantly, economic incentives may favor and determines the choice of CS delivery. Economic motives may include both doctors' fear of malpractice as well as economic gain.[11] In general, it is argued that besides the medical factors, the physician's interests determine the choice of CS**.**

Women's height is correlated to the pelvic size and is currently used to predict cephalopelvic disproportion.[12] Umbilical cord prolapses were associated with an increased risk of neonatal hypoxic brain injury and perinatal death**.** A history of infertility treatment among nulliparous women >40 years old with singleton pregnancies increases the risk for cesarean delivery (CD) independently of other known risk factors. The reported rate of perinatal diagnosis of Cord Entanglement was found to be 23%. Patients with oligohydramnios have significantly higher incidences of fetal heart rate decelerations and CS than patients with adequate amniotic fluid. Neonates with oligohydramnios are twice as likely to develop pulmonary hypoplasia and more likely to experience neonatal death when compared to those with adequate fluid. Induction of labor following CS is associated with a significantly higher incidence of repeat CS in women who have not had a previous vaginal delivery (VD). Lack of progress in labor (also known as dystocia or failure to progress) is a dominant reason for CD. The planned CS is better than the planned VD for the term fetus in the breech presentation.[13]

As CD at one period of time was performed only subsequent to maternal death, but the risk of maternal death has been estimated to be several times due to CD. Still, there are several problems which make it difficult to interpret them. Some reports suggested that there may not be an increased risk of maternal death with elective CD compared with VD however maternal mortality has become rare in affluent countries, but the picture is quite blurred for developing Nations. The risk of maternal death due to CD is significantly high when compared with VD, particularly when performed during labor.[14]

Anesthetic complications, hemorrhage and sepsis, which are mostly preventable in affluent countries, may make major contributions toward maternal mortality in adverse conditions. This needs to be taken into account by clinicians and women when considering the risk-benefit equation.[15] CD is a major surgical procedure and should only be practiced when conditions clearly demand it. The present study will reveal the factors that provoked CD and will also be a major breakthrough in finding out the genuine reasons for dramatically increasing cesarean cases. Research is needed to adequately compare outcomes of planned and unplanned CD. This study will review current research on the rise in CD and its implications related to risks, benefits, ethics, practice, and future research. It includes certain clinical and nonclinical parameters which will help out in assessing, analyzing, and interpretation of the factors that provoked CD. The major clinical parameters will support this up to a great extent to this study.

Materials and Methods

The short-term retrospective study for about 3 months was conducted at Department of Obstetrics and Gynecology, Pt. Deen Dayal Upadhyay Hospital and Northern Railway divisional hospital Moradabad, India. The study was designed to ascertain the short term prevalence of CD and its associated outcomes in Moradabad. The prevalence of CD in India was 10.2%[16] so the sample size required was calculated accordingly with a relative precision of 10.2% of prevalence with a confidence level of 95%, using the formula: Z (1α/2) *pq*/*d*. The calculated sample size obtained was 140 but to make study optimized we have taken the sample size of 345.[17] The Body Mass Index 34 and socioeconomic Status 35 of the subjects were calculated in accordance to previous reported studies.[18]

Data collection

A case record form was designed, reviewed by an expert panel and was pre-tested on 25 cases and was scaled up for study. The first section of the questionnaire was designed to project the basic demographic details such as body weight, age, height, diet, personal background (religion, education, occupation, socioeconomic status), etc., While second section of the questionnaire was designed to record clinical manifestations related to pregnancy or delivery like past or present hormonal therapy, postmenopausal complications, gravida parity, duration between successive gravida parity, mode of delivery whether normal or cesarean, etc. with concerned complications. The data were collected using various data sources from IPD/MICU visited patients.

The questionnaire was completed by collecting required data from Maternity records and laboratory investigation reports (if available) of labor/cesarean ward with the cooperation of present staff. The personal interaction with patients or her attendant was done to precise the accuracy of desired parameters which were mentioned in the questionnaire. Informed consent was taken from the subject or representative of the subject before data collection.

Inclusion criteria

a. Woman hospitalized in the respective hospital
b. A woman should be above of age 18 years
c. Postpartum woman available during data collection
d. Those who are willing to participate actively.

Exclusion criteria

a. A woman not hospitalized in the respective hospital
b. A woman less than the age of 18 years
c. Postpartum woman not available during data collection
d. Those who are not willing to participate.

Statistical analysis

The groups were compared by applying Fisher's exact test for the analysis of categorical variables, and Wilcoxon's

rank-sum test for the analysis of continuous variables that were not normally distributed. A two-sided $P < 0{\cdot}05$ indicated statistically significance.

Results

Patient participation was strictly abided by the provisions of inclusion and exclusion criteria and an informed consent form required before their admission in the study. The study includes postpartum hospitalized females and was classified into two groups, i.e., CD and VD. Out of 345 deliveries, 125 were CD and their prevalence for a particular course of duration was found to be 36.23%. The evaluated baseline data are summarized in Table 1.

Late-age pregnancy abide cesarean-section

As the age of the mother increases, there was more possibility of going through CS. Mothers aged (30 or more) have greater chances of CS delivery than younger counterparts [Table 1].

Optimized body mass index prevents cesarean-section

The study suggested the effect of body mass index and its known confounders such as gestational age, birth weight, maternal age, and maternal height on CS. The BMI of the mother signifies positive relation of CS with body mass index. The risk of CD increased consistently and significantly ($P < 0.001$) with increased BMI. However, differential limits of normal BMI signify that maximum births with the least % of CS occurred with the upper limit of normal BMI and lower limit of normal BMI possessed high % of CS. This signifies the inverse relation of CS with differential levels of normal BMI range.

Educational supremacy favours caesarean-section

The maximum number of births cases were of illiterate women but possessed the least % of CS however births belonging to highly educated women was found to show high % of CS. This signifies that as the education profile was getting high the possibility of CS increased that showed the existence of a statistical association between Education and CS ($P < 0.001$).

Religious intervention favours caesarean-section in Muslims

175 deliveries were belonged to Muslims with 42.85% of CS however 170 deliveries in Hindu possess 29.41% of CS which signifies that there were more CS in the Muslim community among other religions.

Low nutritional value diet might put the mother to cesarean-section

CS was more experience by Non-vegetarian mothers with 42.93% as compared to vegetarians, possessed 27.92% of CS. Junk food eater mothers with 55.46% of CS however Non-Junk food eater mothers experienced only 26.106% of CS. This signifies there was a positive relation of CS with Junk food and non-vegetarian dietary habits.

Rh negative factor: An indication for cesarean-section

As per Rh factor concerned the data represented that majority of deliveries in women are with positive Rh factor with 34.71% of CS cases. Although only 8 births in women with negative Rh factor was found, the probability of CS in terms of percentage was significantly high (87.5%).

Infertility treatment might instigate cesarean-section

Although hormonal therapy improves pre- and post -maternal complications it might instigate CS occurrence. The population taking Hormonal therapy has more probability in terms of percentage (78.84) to undergo CS [Table 1].

Impact of parity on cesarean-section

There was 31.53% of CS during first parity, however a significant increase in CS was found up to third parity (53.65%) but after third parity the occurrence of CS deliveries decreased [Table 2]. In the first parity among the total births, there were five postpartum women which had previous miscarriages. All five women went through CS. In 1st, 2nd, and 3rd parities among the total births there were six postpartum women had previous fetal demised and all 6 women went through CS.

Increased parity gap provoked caesarean-section

The gap between successive parity that was taken in months, there was 28.62% of CS with parity gap of 12–24 months however 100% possibility of CS was found with parity gap of more than 48 months that signifies the proportionate possibility of CS with an increased duration between parities [Table 3].

Cesarean-section results increased bodyweight of new-born

The average maximum weight of new-born is 3.08 kg and the mean weight for all age groups was found to be 2.89 kg. The possibility of CS was increased with increasing baby weight [Table 4].

Cesarean-section prevents infant mortality

The mortality % of CD was 14.28% however for VD it was 85.71% which signifies that CS prevents infant mortality [Table 5].

Maternal and foetal complications provoked cesarean-section possibility

Table 6 represented summarized clinical interventions that provoked CS like cephalopelvic disproportion, infertility, cord entanglement, previous fetal demised and meconium stained etc., however major complications include oligohydramnios and previous lower segment cesarean (LSC). The above-mentioned medical complications were major factors responsible for CS. Overall there was 99.2% possibility of undergoing CS if a woman possessing all the above medical complications.

Discussion

Women today embark on pregnancy at a late age; therefore their chances of undergoing CD were high. Our findings related to maternal age suggested that late age maternity endorsed CS possibility as several studies suggest that women were more prone to complications as the age of pregnancy and delivery increases.[19,20] This study suggested that the risk of CD increased consistently and significantly with increased BMI but optimized BMI favors the VD because higher BMI

Table 1: Caesarean section delivery and its determinant factors

Age distribution of mother undergone different delivery methods					
Age	**TD**	**CD**	**VD**	**Percentage CD**	***P***
19-24	111	25	86	22.52	<0.001
24-29	154	62	92	40.25	
29-34	51	21	30	41.17	
34-39	21	11	10	52.38	
39-44	6	6	0	100	
44-49	2	0	2	0	
Total	345	125	220		
Percentage	100	36.23	63.76		
Women underwent CS as per BMI					
BMI (range)	**TD**	**CD**	**VD**	**Percentage of CD**	***P***
Underweight (≤19.9)	0	0	0	0	<0.001
Normal (20-24.9)	297	95	202	31.98	
Overweight (25-29.9)	48	30	18	62.50	
Total	345	125	220	36.23	
Women underwent CS as per normal BMI range					
Normal BMI	**TD**	**CD**	**VD**	**Percentage of CD**	***P***
20–21.9 (lower limit)	16	10	4	62.5	<0.001
22–23.9 (middle limit)	49	26	23	53.06	
24–24.9 (upper limit)	232	59	173	25.43	
Total	297	95	202	31.98	
Women underwent CS as per education					
Education	**TD**	**CD**	**VD**	**Percentage of CD**	***P***
Illiterate	231	67	164	28.57	<0.001
Primary/middle school	47	17	30	36.17	
High school/intermediate	42	25	17	59.52	
Graduation ≤	25	16	9	64	
Total	345	125	220	36.23	
Women underwent CS as per socioeconomic status					
Status	**TD**	**CD**	**VD**	**Percentage of CD**	***P***
Upper I	0	0	-	0	<0.001
Upper middle II	14	11	3	78.57	
Lower middle III	46	24	22	52.17	
Upper lower IV	285	90	195	31.57	
Total	345	125	220	36.23	
Women underwent CS as per religion					
Religion	**TD**	**CD**	**VD**	**Percentage of CD**	***P***
Hindu	170	50	120	29.41	0.009
Christian	2	0	2	0	
Muslim	170	75	100	42.85	
Sikhs	3	0	3	0	
Total	345	125	220	36.23	
Women underwent CS as per diet					
Diet	**TD**	**CD**	**VD**	**Percentage of C-section**	***P***
Nonvegetarian	191	82	109	42.93	0.004
Vegetarian	154	43	111	27.92	
Total	345	125	220	36.23	

Contd...

Table 1: Contd...

Women underwent CS as per Junk food eaters					
Junk food	**TD**	**CD**	**VD**	**Percentage of C-section**	***P***
Yes	119	66	53	55.46	<0.001
No	226	59	167	26.106	
Total	345	125	220	36.23	
Women underwent CS as per Rh factor					
Rh factor positive/ negative	**TD**	**CD**	**VD**	**Percentage of CD**	***P***
Positive	337	117	220	34.71	0.004
Negative	8	7	1	87.5	
Total	345	124	221	36.23	
Women underwent CS as per infertility treatment					
Yes/no	**TD**	**CD**	**VD**	**Percentage of CD**	***P***
Yes	104	82	22	78.84	<0.001
No	241	43	198	17.84	
Total	345	125	220	36.23	

CD: Caesarean delivery, VD: Vaginal delivery, BMI: Body mass index, TD: Total delivery

Table 2: Women underwent caesarean section as per parity

Birth order	CD	Percentage of CD	TD	Miscarriage	Previous baby not alive
1	70	31.53	222	5 (CS)	1 (CS)
2	30	47.61	63	-	2 (CS)
3	22	53.65	41	-	3 (CS)
4	2	18.18	11	-	-
5	-	0	5		
6	1	50	2		
7	-	0	1		
Total	125		345		

CS: Caesarean section, CD: Caesarean delivery, TD: Total delivery

Table 3: Women underwent caesarean section as per duration between successive parity

Months	CD	Total births	Percentage of CD
12-24	79	276	28.62
24-36	17	29	58.62
36-48	6	9	66.66
48-60	7	7	100
≤60	4	4	100
Total		325	

*The remaining 20 births belong to 1st parity. CD: Caesarean delivery

increases the rate of cephalopelvic disproportion/Failure to progress which favors CS. It is often argued that the power of decision-making in the home and seeking medicalized health care were associated with higher maternal education and family incomes. The study suggests that the proportion of CS is much higher among mothers having secondary and higher education than without education or primary education. In India, the proportion of CD is very high among mothers with high educational background, which perhaps illustrates that women with higher educational attainment can make decisions about their own health care. Researchers have found a strong correlation between increasing CS deliveries with socioeconomic and cultural factors. In some instances, doctors' preferences for the surgical procedure and women's demands are responsible for the increasing trend of CS which imposed a financial burden on the patients. This study supports the fact that as the majority of CS cases belong to the upper socioeconomic class. Besides, this different rates of CS in public and private hospitals suggested that non-medical factors such as economic gain and pressures of private practice may motivate doctors to perform surgical deliveries. Another factor related to decision-making for CS is giving birth in auspicious time or on some special day. In a country like India, where religion and religious believes takes place before any other things, childbirth in an auspicious day perhaps an important factor for opting surgical intervention. Our study represented the correlation between religious beliefs and CS among different communities and it was found that the majority of CS deliveries were from the Muslim community followed by the Hindu community. It has also been noticed from the voices of women that preference for having birth on some special day for religious and cultural reasons exists which sometime comes from family members or the woman herself opted.[21] The higher order births are less likely to deliver by CS, this fact is supported by our study but only after third parity as delivery complications are significantly lower among higher-order pregnancies**.** However, this study on the other hand also showed that up to 3rd parity probability of CS was more likely to occur. The factor that provoked for the performance of CS is large size of the baby at birth and the possibility of CS was increased with increasing baby weight. Larger size babies are at higher risk of being delivered by CS. Moreover, babies with birth weight more than 3 kg are also at

Table 4: Women underwent caesarean section as per new born weight and gender

Age of mother	Average weight of new born (kg)	Male	Female	Percentage of CD	Total births	*P*
19-24	2.77	64	47	27.027	111	0.665
24-29	2.82	97	57	42.207	154	
29-34	2.91	30	21	41.176	51	
34-39	2.94	14	7	28.571	21	
39-44	3.08	2	4	50	6	
44-49	2.85	1	1	-	2	
Mean (%)	2.89	208 (60.28)	137 (39.71)		345	

CD: Caesarean delivery

Table 5: Women underwent caesarean section as per mortality

VD	CD	Maternal deathsfollowing VD	Maternal deathsfollowing CD	*P*	OR	RR	95% CI
220	125	3	11	0.0012	6.980	6.453	1.83-22.70
VD	**CD**	**Neonatal deathsfollowing VD**	**Neonatal deathsfollowing CD**	***P***	**OR**	**RR**	**95% CI**
220	125	17	2	0.0146	0.1942	0.2071	0.044-0.85

OR: Odds ratio, RR: Relative risk, CD: Caesarean delivery, CI: Confidence interval, VD: Vaginal delivery

Table 6: Women underwent caesarean section as per medical factors

Complications	CD	Total births	Percentage of CD
Cephalopelvic disproportion	4	4	100
Infertility	4	4	100
Cord entanglement	4	4	100
Oligohydramnios	22	22	100
Foetal distress	7	7	100
Rh negative	7	8	87.5
Twin gestation	2	2	100
Previous LSC	52	52	100
Pregnancy induced hypertension	1	1	100
Breech presentation	8	8	100
Low foetal weight	2	2	100
More foetal weight	1	1	100
Failure to progress labor	2	2	100
Previous foetal demised	4	4	100
Meconium stained	4	4	100
Total	124	125	99.2

IVF: Infertility, LSC: Lower segment caesarean, CD: Caesarean delivery

high risk. In India, CS is widely perceived as safer than vaginal birth for babies.[22,23] The perinatal mortality, neonatal mortality, or serious neonatal mortality was significantly lower for the planned CS group than for the planned vaginal birth group. The prevalence of obesity in pregnant has reached pandemic proportions across nations. Junk food and nonveg stuffs are considered to have low nutritional values than pure vegetarian diets and also these items were more prone to provoked obesity during pregnancy due to limited or less physical activity. CS in these women poses many surgical, anesthetic, and logistical challenges.[24] We found a significant positive correlation of CS in overweight pregnant women who have Junk food and non-vegetarian dietary habits. The probability of CS in Rh-negative mothers in terms of percentage was significantly high and was supported by the fact that the Rh-negative patients were undergoing CS for the presence of significant fetomaternal hemorrhage.[25] The history of infertility treatment among women > 40 years old with singleton pregnancies increases the risk for CD independently of other known risk factors. Although hormonal therapy improves pre- and post-maternal complications, it might instigate CS occurrence. This study reveals that the population taking Hormonal therapy has more probability to undergo CS. Cephalopelvic disproportion is a major risk factor for maternal and perinatal morbidity and mortality. Women's height is correlated to the pelvic size and is currently used to predict Cephalopelvic disproportion. The pregnancies conceived by IVF and ovulation induction have led to an increase in the number of multiple births and these babies are usually delivered by CS.[26] The reported rate of perinatal diagnosis of Cord Entanglement is only 23% and fetal movements may increase tightening of an already entangled umbilical cord which could lead to occlusion and fetal distress. Patients with oligohydramnios have significantly higher incidences of fetal heart rate decelerations and CS than patients with adequate amniotic fluid. Neonates with oligohydramnios are twice as likely to develop pulmonary hypoplasia and more likely to experience neonatal death when compared to those with adequate fluid. The induction of labor following CS is associated with a significantly higher incidence of repeat CS in women who have not had a previous VD.[27] Many Caesareans are done during the latent phase of labor and in the second stage of labor when it is not prolonged. Repeated lower section caesareans (LSC) and lack of progress in labor (also known as dystocia or failure to progress) are the most common reasons for CD.[28] Number of clinical interventions that provoked CS were reported during the study like cephalopelvic disproportion, infertility, cord entanglement, previous fetal demised and meconium stained etc., however, major complications include oligohydramnios and previous LSC.[29]

Conclusion

This study illustrates the major factors that provoked CD. It acknowledges that the provision of CD is universally accepted as it ensures feto-maternal safety. The mortality of maternal with CD was found to be lower as compared to VD. Although number of studies suggested that CS delivery is a major risk of maternal so the present study suggested that there are some demographic and medical factors which are directly or indirectly molding the occurrence of CS deliveries. At some point, medical advisors and pregnant women can change the scenario of CD of India. It was recommended from the study that the obstetrical interventions should be evidence-based and the intervention should strictly be applied to women with complications.

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Conflicts of interest

There are no conflicts of interest.

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ملخص المقال باللغة العربية

المؤشرات المساهمة لدواعي استخدام الولادة القيصرية: دراسة من مستشفيات الرعاية الثالثية

المؤلفون

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الخلفية: ترتبط كل من الولادة القيصرية والولادة المهبلية بمضاعفات وفوائد معروفة وقابلة للقياس قصيرة وطويلة الأمد للأمهات والولدان.

الهدف: أجريت الدراسة الحالية بأثر رجعي على أساس أولي لتقييم العوامل المساهمة التي تؤدي إلى الولادة القيصرية.

المواد والطرق: أجريت الدراسة بأثر رجعي قصير المدى (6 أشهر) في قسم أمراض النساء والتوليد، دين دايال أوبدهياي ومستشفى قسم السكك الحديدية الشمالية مراد آباد، أوتار براديش، الهند. تم حساب حجم العينة وفقًا لذلك بدقة نسبية قدرها 10.2٪ من الانتشار ووجدناه 140. حجم العينة المستعملة كانت 345.

النتائج: كانت نسبة الولادة القيصرية 36.23٪. زاد خطر الولادة القيصرية (P <0.001) مع زيادة مؤشر كتلة الجسم. ومع ذلك، تشير الحدود التفاوتية لمؤشر كتلة الجسم الطبيعي إلى أن معظم العمليات القيصرية كانت للذين لهم الحد الأدنى لمؤشر كتلة الجسم الطبيعي. كما وجد أن ارتفاع مستوى التعليم مرتبط بزيادة نسبة إجراء العملية القيصرية. احتمالية إجراء عملية قيصرية للنساء الحاملات لمعامل الريسوسي السالب من حيث النسبة المئوية كانت 87.5٪. كان هناك زيادة متناسبة لإجراء عملية قيصرية مع زيادة الفجوة بين الزوجين. كانت النسبة المئوية لوفيات الأطفال حديثي الولادة بعملية قيصرية والولادة المهبلية 14.28٪ و85.71٪ على التوالي، مما يدل على أن الولادة القيصرية تمنع وفيات الرضع. كان هناك احتمال بنسبة 99.2٪ للخضوع لعملية قيصرية إذا كانت المرأة تعاني من مضاعفات طبية.

الخلاصة: أقرت الدراسة الحالية أن الولادة القيصرية تضمن سلامة الجنين والأم. ومع ذلك، أبرزت الدراسة أيضًا بعض المؤشرات التي قد تزيد من احتمالية الولادة القيصرية.

الكلمات المفتاحية: مؤشر كتلة الجسم، الولادة القيصرية، الولادة المهبلية.