

# Indications and rate of first cesarean delivery in central region's maternity and children hospital

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## ABSTRACT

**الأهداف:** فحص دواعي أول عملية قيصرية أجريت للحوامل وتصنيف هذه الدواعي إلى إلزامية و شبه ملزمة حسب الارشادات الخاصة بالعمليات القيصرية ومن ثم مقارنتها طبقاً للديموغرافية و الروابط المتعلقة بالحمل .

**المنهجية:** تم تحليل بيانات الولادات ( من ملفات الحوامل ) خلال الفترة من سبتمبر 2018م وحتى أكتوبر 2018م في مستشفى الولادة والأطفال ببريدة في منطقة القصيم .

**النتائج:** قمنا بدراسة العمليات القيصرية لأول مرة لدى 200 حامل . دواعي هذه العمليات كانت حدوث ضائقة للجنين في 55 حالة ( 27% ) ، تليها عدم تقدم المخاض في 45 حالة ( 22.5% ) ، المجيء المقعدي للجنين في 36 حالة ( 18% ) ، فشل بدء المخاض في 9 حالات ( 4.5% ) ثم دواعي غير معرفة في 8 حالات ( 4% ) . 53 حالة ( 26.5% ) كانت إلزامية ، و 100 حالة كانت شبه ملزمة للقيصرية ، بينما وجدت 47 حالة من غير التصنيفات السابقة و بلغ عنها كدواعي "أخرى" .

**الخلاصة:** المؤشرات الأكثر شيوعاً لأول مرة قيصرية ، بترتيب تنازلي ، هي ضائقة الجنين وعدم تقدم المخاض والعرض المقعدي .

**Objectives:** To investigate the indications of first (non-repeated) cesarean deliveries, to categorize those indications into absolute and relative according to established guidelines of cesarean deliveries, and to compare the women with absolute and relative indications by demography and pregnancy-related attributes.

**Methods:** A cross-sectional analysis of delivery data between September and October 2018, at the Maternity and Children Hospital, Buraidah, Al-Qassim, Saudi Arabia. Indications for cesarean deliveries of 200 primary cases were abstracted and were categorized into 'absolute' and 'relative' according to the Association of the Scientific Medical Societies in Germany guidelines.

**Results:** The leading indications were fetal distress (27.5%), non-progression of labor (22.5%), breech

presentation (18%), and failed initiation of labor (4.5%). Of the 200 cases, 26.5% had absolute indications, 50% had relative indications, and 23.5% had indications that were neither absolute nor relative. Women with absolute indications had lower mean gestational age and a higher proportion with >3 gravida than women with relative indications ( $p<0.05$ ).

**Conclusion:** The most common indications for first time cesarean, in decreasing order of frequency, were fetal distress, non-progression of labor, and breech presentation.

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Cesarean section (c-section) is a surgical procedure in contrast to a natural vaginal delivery. In a c-section, a baby is delivered after incisions are made in the abdomen and uterus of the mother. A c-section is usually planned for women who have previously given birth with this method. Some women who are pregnant for the first time also desire to deliver via this surgical procedure in order to avoid labor pain or possible complications of vaginal birth. This is an unwanted situation, and physicians should not give in to this desire of prospective mothers as data show that such practices have adverse consequences for both the mothers and their babies.<sup>1</sup>

Nonetheless, planned c-sections for women who are pregnant for the first time are on the rise worldwide. In the United States (US), the primary cesarean rate (namely, performed for the first time on a pregnant woman) has increased from 11% in 1979 to 18.5% in 2010 with a strong relationship demonstrated between maternal age and c-section rate.<sup>2</sup> Similarly, in Pakistan, nearly 70% of all c-sections are primary, with an overall c-section rate of 14%.<sup>1</sup> The most important indications for primary c-section reported in these studies included obstructed labor due to cephalopelvic disproportion, fetal distress, and abnormal presentation. The factors significantly associated with primary c-section were young age (<20 years), first pregnancy, premature rupture of membranes, antecedent of labor room induction, and neonatal weight >3500 grams.<sup>1</sup> However, the increasing c-section rate phenomenon may vary elsewhere in the world. For instance, in Italy, the primary c-section rate went down from 31% in 2009 to 26% in 2013.<sup>3</sup>

Saudi Arabia is no exception when it comes to c-section evolution. There is a noticeable variation in the reported c-section rate among Saudi studies.<sup>4,5</sup> The type of hospital where these studies were conducted may have contributed to this large variation in estimates. For example, referral hospitals, where complicated cases are sent, were more likely to perform c-sections than vaginal deliveries.<sup>4</sup> Most Saudi studies presented c-section data as elective versus emergency procedure. While this dichotomy is helpful for understanding to what extent c-sections are planned, it is not synonymous with primary versus repeated c-section cases. While women with a past history of c-section were more likely to get a c-section, there may be some women who also received this procedure with their first child. There are specific indications for c-section for women with their first delivery, while elective c-sections are considered a separate indication if there are no medical indications except for the mother's wish for operative intervention; primary c-section indications can be divided broadly into absolute and relative according to the Association of Scientific Medical Societies in Germany (AWMF) guidelines.<sup>6</sup> There is no Saudi-specific data in that respect,<sup>4,5</sup> and without data, it is not possible to know to what extent women receive c-sections for their first deliveries when it is not absolutely indicated.

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Therefore, in this study, we evaluated the medical records of women, regardless of parity, who gave birth to their first child via c-section in a referral hospital in the Central region of Saudi Arabia. We compiled and grouped the indications for their c-sections and explored the factors associated with the relative indications.

**Methods.** We conducted this study in the Maternity and Children Hospital (MCH) in Buraidah - a referral center for the Al-Qassim, Saudi Arabia. We used a cross-sectional records-based design and extracted data from patients' medical records. Our target was to retrieve the data of 200 first primary cesarean section cases. We started our data collection on September 2018 and checked all delivery records (example operating room logbook) of the MCH for women who received a primary c-section. The inclusion of the study: 1) first primary (non-repeated) caesarean section; 2) The caesarian delivery took place in MCH; and 3) records were available at the time the study was conducted, between September 2018 and October 2018.

We abstracted c-section indications along with demography and other pregnancy-related attributes for any delivery that matched the eligibility criteria and entered that information into an electronic database. We achieved our target sample of 200 by October 13, 2018. We categorized the c-section indications into 'absolute' and 'relative' according to the German guidelines for cesarean deliveries. Additionally, we compared the women with absolute and relative indications in terms of their demography and pregnancy-related attributes.

We evaluated the indications of these cases according to the c-section indications defined by the AWMF guidelines.<sup>6</sup> Absolute indications were absolute disproportion, chorioamnionitis, maternal pelvic deformity, eclampsia and hemolysis, elevated liver enzyme levels and a low platelet content (HELLP) syndrome, fetal asphyxia or acidosis, umbilical cord prolapse, placenta previa, abnormal lie and presentation, and uterine rupture. Relative indications included pathological cardiotocography (CTG), failure to progress in labor, and a previous c-section.

Primary c-section was defined as patients who had their first cesarean delivery, unrelated to previous vaginal deliveries. Repeated c-section cases meant patients who had undergone c-section prior to our data collection period.

Age, gestational age, nationality (Saudi, non-Saudi), gravidity (1-3, >3), parity (0-3, >3), abortion (yes, no), fetus number (single, multiple), indications for c-section as written in the MCH logbooks.

**Statistical analysis.** Data was analyzed using the Statistical Package for Social Sciences, version 25 (IBM Corp, Armonk, NY, USA) and descriptive analysis for primary c-section was formulated. Descriptive statistics were presented with means and standard deviation (SD) for continuous variables and frequency charts and tables for categorical variables. Covariates were compared across the indications of first time c-section with independent-samples t-test for continuous variables and Chi-square test for categorical variables. The statistical analysis was conducted using 2-sided tests with an alpha level of  $<0.05$ . The study protocol was approved by the Qassim Ethics Research Committee at the Ministry of Health, Al-Qassim, Saudi Arabia.

**Results.** There were a total of 1165 deliveries during the 2-month period, of which 659 were vaginal deliveries, while 506 (43%) cases were c-sections, either primary or repeated, comprising both emergency and elective operations. We collected 200 cases of primary c-section, of which 183 (93.5%) were Saudi citizens. Of all the primary c-section cases, 190 were single-tons (95%), 9 were twins, and one was triplets. The demographics and patient characteristics of the enrolled sample are shown in Table 1.

With regards to the reported primary indications, they were led by 55 (27.5%) cases of fetal distress, followed by non-progress of labor in 45 (22.5%), breech presentation in 36 (18%), failed initiation of labor in 9 (4.5%), and other indications (not reported in the records) in 8 (4%) cases. Table 2 shows the top 10 indications of primary c-section.

After categorizing the encountered indications into absolute and relative using the AWMF guidelines, 53 cases (26.5%) had absolute indications, while 100 cases (50%) had relative indications. The rest of the cases ( $n=47$ , 23.5%) had indications that did not fit the classifications of either absolute or relative and were, hence, classified as “other” indications, such as preeclampsia, hypertension in pregnancy, diabetes mellitus, gestational diabetes mellitus, refusal of normal vaginal delivery, refusal of induction of labor and premature rupture of membrane.

While looking into the absolute and relative indications as per the AWMF guidelines, a significant association was noted between the type of indication and age ( $p<0.001$ ), gestational age ( $p<0.001$ ), and gravidity ( $p<0.001$ ), as shown in Table 3.

**Discussion.** Most of the participants who underwent c-section were Saudi women. Sixty-two percent of our sample were aged above 30 years, and our

study showed a significant association between c-section indications (relative or absolute) and age. This finding is supported in the literature. Ananth et al<sup>2</sup> concluded that advanced maternal age correlated with a rise in c-section delivery. Kamil et al<sup>7</sup> in King Fahad Medical City, Riyadh, Saudi Arabia identified non-reassuring cardiotocography as the most common indication with several significant associations: higher maternal age, parity, and prematurity. Ahmed et al<sup>8</sup> studied the associated factors and frequency of c-sections at King

**Table 1 -** Baseline demographics and characteristics of the study sample ( $n=200$ ).

Variables	n (%)
<b>Age, mean<math>\pm</math>SD</b>	31.14 $\pm$ 6.17
<30 years	77 (38.5)
30-40 years	109 (54.5)
>40 years	14 (7.0)
<b>Nationality</b>	
Saudi	187 (93.5)
Non-Saudi	13 (6.5)
<b>Parity</b>	1.47 $\pm$ 2
Para 0	104 (52.0)
Para 1-2	42 (21.0)
Para 3-5	45 (22.5)
Para >5	9 (4.5)
<b>Gravidity, mean<math>\pm</math>SD</b>	2.82 $\pm$ 2.3
1-3	140 (70.0)
4-6	45 (22.5)
7-10	11 (5.5)
>10	4 (2)
<b>Gestational age (weeks), mean<math>\pm</math>SD</b>	38.51 $\pm$ 2.3
>35	12 (6.0)
45-40	156 (78.0)
>40	32 (16.0)
<b>Number of fetuses</b>	
Single	190 (95)
Multiple	10 (5.0)
<b>Abortion status</b>	
No abortion	155 (77.5)
Positive abortion	45 (22.5)

**Table 2 -** Summary of the top 10 indications of primary cesarean section.

Indications	n (%)
Fetal distress	55 (27.5)
Non-progress of labor	45 (22.5)
Breech	36 (18.0)
Failed initiation of labor	9 (4.5)
Unknown	8 (4.0)
Twin	4 (2.0)
Antepartum hemorrhage	4 (2.0)
Placenta previa	4 (2.0)
Twin both breech	4 (2.0)
Intrauterine fetal death	3 (1.5)

**Table 3 -** First time c-section indications (absolute versus relative) and patient characteristics.

Characteristics	Absolute indication (n=53, 26.5%)	Relative indication (n=100, 50%)	P-value
Age (mean±SD)	31.0±5.9	31.1±6.3	0.92
Gestational age (mean±SD)	37.8±2.3	39.1±1.8	<0.001*
<b>Nationality</b>			
Saudi	52 (98.1)	91 (91.0)	0.166
Non-Saudi	1 (1.9)	9 (9.0)	
<b>Gravidity</b>			
1-3	28 (52.8)	81 (81.0)	<0.001*
>3	25 (47.2)	19 (19.0)	
<b>Parity</b>			
0-3	41 (77.4)	88 (88.0)	0.103
>3	12 (22.6)	12 (12.0)	
<b>Abortion</b>			
No	39 (73.6)	81 (81.0)	0.307
Yes	14 (26.4)	19 (19.0)	
<b>Fetus number</b>			
Single	51 (96.2)	97 (97.0)	1.0
Multiple	2 (3.8)	3 (3.0)	

Values are presented as numbers and percentages (%). \*Denotes significance

**Table 4 -** Summary of the “other” indications of primary cesarean section.

Indications	n (%)
Severe pre-eclampsia toxemia	3 (1.5)
Insulin-dependent diabetes mellitus	3 (1.5)
Umbilical cord prolapse	2 (1.0)
Transverse lie	2 (1.0)
Abruptio placenta	2 (1.0)
Refusal of normal vaginal delivery	2 (1.0)
Hydrocephaly	2 (1.0)
Gestational diabetes mellitus	2 (1.0)
Hypertension in pregnancy	1 (0.5)
Multiple gestation >2	1 (0.5)
Premature rupture of membranes	1 (0.5)
Bleeding in labor	1 (0.5)
Oligohydramnios	1 (0.5)
Spontaneous rupture of membranes >24 hours	1 (0.5)
Epilepsy	1 (0.5)
Refusal of induction of labor	1 (0.5)
Intrauterine growth restriction	1 (0.5)
Post-term	1 (0.5)

Abdulaziz Medical City over the course of 3 months (March to June 2018); the significant association with a marked rate of c-section was advanced maternal age as with each year, the rate of c-section increased by (8%). Similar increases were seen in other studies and were attributed to an increased incidence of pregnancy complications occurring with older age.<sup>7</sup>

One of the major findings of our study was the high rate of c-section (43%). AlSheeha et al<sup>4</sup> investigated the rate and indications of cesareans, both first and repeated, and reported a rate of 55% between August and October 2016 in the same institution as our study. They presented repeated c-section as the most common indication (21.5%), followed by failure to progress (9%), which was the second most common in both studies fetal distress 8% was their third most common, whereas in our study, it was the most common cause of primary c-section. They excluded twin pregnancy, whereas we have included it in our analysis. Both results are considered far higher than the optimal rates proposed by the international healthcare community of the World Health Organization (WHO), which indicates that the ideal rate for c-sections is between 10% and 15%.<sup>9</sup> The high c-section rates that we and AlSheeha et al<sup>4</sup> found might be explained by the fact that our hospital is a tertiary center and receives referrals from all other cities in the Central region; these referrals are usually high-risk and complicated cases that would be ultimately managed with c-sections.

Al-Kadri et al<sup>5</sup> aimed to identify causes of increased c-sections in the Central region of Saudi Arabia on 2 groups 6 years apart; the most common indication was a previous c-section in 2002 (28%) and 2009 (30%). An abnormal CTG (21%) was the second most common indication in 2009, its predecessor being failure to progress (27%) in 2002, which stood third in 2009 at 19%. In a US-based study, the most common indications in descending order were a previous c-section, non-reassuring fetal status, labor complications, ischemic placental disease, hypertensive disorders, and malpresentation.<sup>2</sup> Abbaker's et al<sup>10</sup> study in Sudan revealed a c-section rate of 43.2%, of which 25% were primiparae. The most common indication was a previous c-section (40%), followed by failure to progress (12%), breech presentation (8%), hypertensive disorders (8%), post-term (4%), antepartum hemorrhage (3.5%), fetal conditions (3.5%), and diabetes mellitus (1%).

Obesity and pregnancy are highly relevant as obesity has increased 30% among Saudi females, and maternal and fetal complications have increased proportionally. Cesarean rates increase with increasing weight, reaching 15% in overweight, 16% in obese, and 25% in morbidly obese women, compared to only 5% in the normal weight category.<sup>11</sup> This has also been observed in other studies showing that obese women have a significantly higher rate of cesarean deliveries and adverse pregnancy outcomes. For example, Kawakita et al<sup>12</sup> investigated



this important aspect of c-section deliveries in the US, showing that increased maternal weight led to an increased rate of primary cesarean delivery unrelated to parity. The most common indication was failure to progress/cephalopelvic disproportion in both nulliparous and multiparous women with above normal body mass index. Of importance, a recent study found an estimated prevalence of pre-gestational diabetes was 4%, and gestational diabetes was 24% in a multicenter cohort from 3 hospitals in Riyadh, Saudi Arabia.<sup>13</sup> Wahabi et al<sup>13</sup> concluded that women with pre-gestational diabetes were more likely to undergo Cesarean section, while those affected by gestational diabetes had more macrosomic babies.

**Study limitations.** The frequency of c-sections and indications of primary c-section could be very educative with regards to associations and may form a preliminary link for the etiology of non-repeated c-section indications in the country. However, the findings of our study cannot be generalized to the whole of Saudi Arabia as it represented only women who delivered at MCH in Central during a short period of time (2 months). We did not investigate obesity, diabetes or other comorbidities in particular, which may have added to the current information.

In conclusion, the cesarean delivery rate in Saudi Arabia is variable, being extremely high in certain studies. Improved healthcare in Saudi Arabia, ease of access to tertiary centers, safer practices, lowered post-operative complications, prevalent comorbid diseases like diabetes and obesity, involvement of senior surgeons in operative decisions, lack of education, and maternal perception of lowered pain compared to normal vaginal delivery are factors that should be evaluated when considering the high rates of c-section. Optimal care should be provided when considering c-sections, and indications should be identified before planning the operation. Implementation of a national standard for c-section indications and study of multiple regions of Saudi Arabia is necessary to grasp the whole picture of the increased rate of cesarean delivery in this country.

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