# The Jordanian cesarean section rate

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## ABSTRACT

**Objective:** This study was conducted to determine the Jordanian cesarean rate and to examine the related indications for cesarean section (CS) in comparison with international rates.

**Methods:** Between 1990 to 2001, there were 243271 deliveries at 7 major military hospitals, (King Hussein Medical Center; Queen Alia Hospital, Amman; Prince Hashem Ben Al-Hussein Hospital, Al-Zarqa; Prince Ali Ben Al-Hussein Hospital, Al-Karaq; Prince Zaid Ben Al-Hussein, Al-Tafileh; Prince Rashid Ben Al-Hassan, Irbid; Princess Haya Al-Hussein, Aqaba) that reflect the main cities in Jordan, of which 22621 CS were performed. Two periods for the study were taken, the first from January 1990 to December 1992 and the second from January 1999 to December 2001 to examine the changes in the rate and indications for CS. Cesarean deliveries were classified according to 5 indications: breech presentation, dystocia, repeat cesareans, fetal distress and "others". Comparison by indication between the 2 periods and with the United States of America (USA) studies was discussed. Significance of differences was assessed using Chi-Square test.

**Results:** Out of 48280 deliveries performed during the first period, 3854 CS were performed with an incidence of 8%, while 8353 CS were performed during the second period out of 76611 deliveries with an incidence of 10.9%. This difference in rate showed 2.9 per hundred deliveries increase in the cesarean rate between the 2 periods. Comparison between the 2 periods showed no significant change in CS rate for breech category ($p$=0.158). A highly significant increase was found for fetal distress category ($p$=0.000), while dystocia and repeat CS showed a high significant decrease in CS rate ($p$=0.000) in the second study period. Analysis of the Jordanian CS rate and related indications for the operation compared with USA reports showed a high significant increase in Jordanian cesarean rate for breech, fetal distress and "other" categories ($p$=0.000), while a high significant decrease for dystocia and repeat cesarean was found ($p$=0.000).

**Conclusion:** The lower cesarean rate in Jordan is attributed to lower frequencies of CS for dystocia, due to more accuracy in estimation of the fetal body weight, and with proper use of oxytocin dosage, which can correct malrotation of vertex leading to subsequent reduction in CS rate for dystocia. Policies, such as: active management of labor, trial of scar, maintenance of the skills required to supervise vaginal delivery when there is a breech presentation and better definition of the deliveries in which fetal monitoring will be useful in the diagnosis of fetal distress; all will achieve acceptable cesarean rate.

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Cesarean section has been one of the most important operations in obstetrics and gynecology as of its lifesaving value to both mother and fetus. Since the 1940s, the operation has been repeatedly modified to improve its safety, which had made the birth by cesarean section (CS) a practical alternative to vaginal delivery. The cesarean birth rate showed dramatic rise in the last 2 decades. There is general agreement that the most important obstetric indications responsible for this increase are dystocia, breech presentation, fetal distress, and previous cesarean delivery.[1-6] Important factors responsible for this change in cesarean rate include the increased safety of the operation due to

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improvement in surgical technique, better anesthesia, antibiotic use, availability of blood products, and the improved prognosis of low birth weight infants.[1,7] Despite the inherent in the data, CS is associated with significant reduction in maternal and prenatal mortality.[2,3,4,8] The figures continue to rise in many countries as of the broad indications for the procedure. Indeed, in few areas the indications may become more restrictive. The international cesarean rates vary widely, but the upward trend is reflected in both the United States of America (USA) and European countries, signifying a change in obstetric practice.[3] In Brazil cesarean rate reached 32%.[9] In the USA and Canada, the national rates have been reached almost 25% and 20%.[8,10] In Italy, the cesarean rate rose from 11% in 1980 to 17% in 1987.[11] In the United Kingdom the rate had reached 12%.[11,12] Also the rate had increased in countries, such as Sweden, Hungary, and Australia to more than 16%.[13] We conducted this study to determine the Jordanian cesarean rate and to examine the related indications for the procedure in comparison with international studies.

**Methods.** Between 1990 to 2001, there were 243271 deliveries at 7 major military hospitals reflecting the main cities in Jordan, of which 22621 CS were performed. Main period for the study is taken from January 1999 to December 2001, during which there were 76611 deliveries, of which 8353 CS were performed. The data were obtained from the annual statistical reports and from the delivery logbook in each hospital. Many studies[1,2,5,6,14] had indicated that the indications for CS are related to 5 categories (repeat cesareans, dystocia, breech presentation, fetal distress and "other") and we considered these categories appropriate for analysis in our study.

We considered the following rules to assign a single clinically reasonable indication: 1. Repeat CS include all cases having 2 or more previous CS and cases of previous one CS who had failed trial of labor for vaginal delivery; 2. The term dystocia includes malpresentation (except breech presentation), failure to progress, cephalopelvic disproportion and failed forceps delivery or vacuum extraction; 3. The term fetal distress includes cases where CS was carried out for the changing in the fetal heart rate pattern (mainly severe bradycardia) regardless of the other indications; 4. Under the term "other" included placenta praevia, abruption placenta, severe pre-eclampsia, multiple pregnancies and cord accidents. In order to examine the cesarean rate and the effect of these indications on altering this rate, we compared the data for the period 1999 to 2001 (second period) with those obtained by the same way for the period from January 1990 to December 1992 (first period). The data were analyzed for the mode of delivery and for each indication for CS. Finally, we compared our results with those reported in many studies in the USA as a country with high cesarean rate.[3,4,5,6,15]

Statistical analyses were performed with the Pearson Chi-Square test. Differences were considered statistically significant when $p<0.05$.

**Results.** Twenty-two thousand six hundred and twenty-one CS were performed during the period from 1990 to 2001, where cesarean rate showed slight increase through the last decade to be 10.9% for the study period. Despite this slight increase, the Jordanian CS rate is still low in comparison with the international cesarean rate which ranges from 10% in some countries, such as: Hungary, Netherlands and New Zealand to 20-30% in other countries, such as: Canada, USA and Brazil. Follow up of CS rate for the last 12 years at the study hospitals showed increase in cesarean rate from 1990 to 2001, as shown in **Table 1**. From a total number of 48280 deliveries in the first period, 3854 CS were performed (8%), while 8253 CS were carried out during the second period (10.9%) out of 76611 deliveries, which resulted increase in cesarean rate by 2.9 per hundred deliveries. This rate is considered low in comparison with cesarean rates in many other countries. **Table 2** shows the number and percentage of each indication from the total number of CS for the first and second periods. There was no significant difference in CS rate for breech category between the two periods ($p=0.158$). A highly significant increase was found for fetal distress and "other" categories ($p=0.000$), but dystocia and repeat cesarean categories showed high significant decrease in CS rate in the second period ($p=0.000$). Analyzing our data in comparison with those reported by many USA studies, we found a high significant increase in Jordanian section rate for breech, fetal distress and "other" categories ($p=0.000$), while a high significant decrease for dystocia and repeat CS was observed ($p=0.000$) as shown in **Table 3**

**Discussion.** There was a 2.9 % increase in the rate of CS from 8-10.9 per hundred deliveries. This increase compared with increase in the rate in the USA and in many European countries is very small. To explain why Jordanian cesarean rate is still low despite the increase internationally, as: the same policy is used in most military hospitals in Jordan. Trial of labor for fetuses weight >4000 gm, the use of oxytocin in higher doses and for longer duration and importantly the decrease in performing the procedure for fetuses of gestational age <30 weeks due to the absence of highly qualified neonatology units,[16] supervision and performance of deliveries by midwives in more than 85%; all with the relative

absence of medico legal pressure were possible factors which contributed to the minimal change and the lower cesarean rate in Jordan during the last decade. While the increased cesarean rates in USA, UK and many European countries referred to many reasons, such as the fear of medico legal action which may make it difficult for an obstetrician to refuse a direct request for CS in a woman with scarred uterus as of the risk of problem with a subsequent labor. The failure to perform a CS in these situations is one of the most frequent reasons for litigation,[14] therefore, the term dystocia was over diagnosed to justify the performance of CS. Al-Mufti et al,[7] had observed that some women when pregnant choose elective CS in the absence of any clinical indications. This is due to the fear of long-term squeal (stress incontinence and anal sphincter damage duo to vaginal delivery) and the fear of long-term effect on sexual function. Also, large proportion of elective CS associated with maternal request for the operation have been reported in many other studies.[17,18] Financial incentives also resulted in higher cesarean rates, where physicians in the USA are paid twice as much for CS as for a vaginal delivery.[14] One factor may be that most of the deliveries in the USA, Canada and some European countries are supervised by doctors rather than midwives, and in countries where midwife delivery predominate generally have lower cesarean rates.[11,19]

In addition, the indications for CS such as, Dystocia, breech presentation, repeat cesareans and fetal distress are acceptable reasons to perform CS. According to the international data, repeat cesareans and dystocia are the major indications for CS.[1,3,4,5,6] Also, there is an increasing number of obstetricians whom following the advice of Wright[20] who reported that all breech presentations should be delivered by CS. There are recent reports that assign a higher relative risk of death to those delivered vaginally[21,22] and the general practice is still to deliver most breeches by CS regardless of the estimated fetal weight.[23] This study shows that breech presentation was the major indication for CS. Our study revealed that reasons for the increased CS for babies presented with breech are increased parity due to pendulous abdomen and increased incidence of fetal abnormalities as hydrocephalus with achondroplasia and the increased incidence of uterine anomalies and placenta praevia (data not shown ). Also, important factor responsible for this increase is the physician style, where more than 80% of the obstetricians are prone to perform CS rather than vaginal delivery, and vaginal breech delivery performed in selected women.[24] There is evidence that external cephalic version can substantially change the incidence of breech presentation at delivery precluding the need for CS.[18] Dystocia represents the second major

**Table 1 -** Cesarean section rate in Jordan from 1990 to 2001.

| Year | Total deliveries | Cesarean sections | Cesarean birth rate |
|---|---|---|---|
| 1990 | 15281 | 1150 | 7.6 |
| 1991 | 16404 | 1329 | 8.1 |
| 1992 | 16595 | 1375 | 8.3 |
| 1993 | 17214 | 1463 | 8.5 |
| 1994 | 17579 | 1511 | 8.6 |
| 1995 | 17737 | 1543 | 8.7 |
| 1996 | 19821 | 1804 | 9.1 |
| 1997 | 21023 | 1833 | 8.7 |
| 1998 | 25006 | 2258 | 9 |
| 1999 | 26669 | 2665 | 10 |
| 2000 | 24875 | 2802 | 11.2 |
| 2001 | 25067 | 2883 | 11.5 |
| **Total** | **243271** | **22624** | **-** |

**Table 2 -** Number and percentage of each indication from the total number of cesarean sections for the periods 1985-1997 and 1994-1996 and the significance of differences between the 2 periods.

| Indication | The period 1990-1992 | | The period 1999-2001 | | $x^2$ | *p* value |
|---|---|---|---|---|---|---|
| Breech | 767 | (19.9) | 1820 | (21.8) | 3.577 | 0.158 |
| Dystocia | 856 | (22.2) | 1470 | (17.6) | 22.556 | 0.000 |
| Repeat cesarean | 1133 | (29.4) | 1595 | (19.1) | 95.741 | 0.000 |
| Fetal distress | 327 | (8.5) | 1136 | (13.6) | 46.322 | 0.000 |
| Other | 770 | (20) | 2330 | (27.9) | 51.824 | 0.000 |
| **Total** | **3853** | **(100)** | **8351** | **(100)** | **220** | **-** |

**Table 3 -** Comparison of indications for cesarean section between Jordan and United States of America (USA) studies.

| Indication | Jordan (%) | USA* (%) | *p* value |
|---|---|---|---|
| Breech | 21.8 | 12 | 0.000 |
| Dystocia | 17.6 | 30 | 0.000 |
| Repeat cesarean section | 19.1 | 35 | 0.000 |
| Others | 13.6 | 9.3 | 0.000 |
| **Total** | **100** | **100** | **-** |

*References 3,4,5,6,16

indication for CS, where it accounts for 17.6% of CS. Significant decrease from the first to the second period in the percentage of CS, which performed for dystocia was found. Due to more accurate in estimation of fetal body weight, and proper usage of high dosage of oxytocins to overcome vertex malrotation. This drop in the rate of dystocia accompanied with drop in the rate of repeat cesareans had an important effect in lowering the Jordanian cesarean rate, also many studies reported that the active management of labor with proper use of oxytocin dosage can correct dysfunctional labor and malrotation of the vertex leading to subsequent reduction in CS rate for dystocia.[25-27] Epidural anesthesia has been suggested as a predisposing factor to dystocia with a subsequent increase in CS rats.[28] Williams et al [29] reported that the use of assisted vaginal delivery by vacuum or forceps might decrease the overall cesarean rate by 3%. In our study, the active management of labor, decreased performance of epidural anesthesia (data not shown), and increased rate of instrumental delivery during the second period in comparison with the first period, had significantly influenced the lower cesarean rate for dystocia and the significant difference with the comparison cesarean rate for the same diagnostic category. In the USA and Europe, repeat cesareans by far represents the most frequent indication to perform another CS, where it accounts for more than 35% of CS.[3,4,5,6,15] In our study, it is responsible for nearly 19% of CS, where it showed significant decrease from the first to the second period. The increased rate of vaginal delivery after a prior CS through the last 12-years with the decreased rate of dystocia which mentioned above were contributing factors to the lower cesarean rate in Jordan.[30,31] Recently, researchers have tried to predict the likelihood of success or failure with a trial of labor after a previous CS.[32-34] In spite of the numerous reports highlighting successes in individual hospitals and in spite of the support of the American College of Obstetricians and Gynecologists, rates of vaginal births after CS remain disappointingly low.[35,36] Countries in Europe achieve more than 50 % vaginal births after a prior CS compared with 25 % in the USA[4] but in our region it was achieved in more than 75%.[24,29,30] Also fetal distress contribute to an increase CS rate significantly. Between the 2 study periods, where it contributes to 13.6 % of CS. In our study, the diagnosis of fetal distress was based on the abnormal cardiotocographic (CTG) findings and the proved severe fetal bradycardia by the intermittent auscultation. A number of randomized controlled trials support that the introduction of electronic fetal monitoring is contributed to increasing CS rate for this category.[37,38] Several authors have reported decreased CS rates after the institution of fetal scalp blood sampling (FSS).[39] Of particular concern is that monitored patients have higher CS rate than those who are not monitored, although the CS are not necessarily a response to fetal distress.[37,40] Butler et al[19] found that the incidence of fetal distress to be 2.7% in the midwife group versus 5% in the physician group, suggesting over utilization of this diagnosis by physicians. In our opinion, these observations and the limited use of FSS were the main reasons for the significant increase in CS for fetal distress in our study and the significant difference with the comparison cesarean rate for the same diagnostic category. The other category showed a significant increase from the first period to the second one. The increased age and parity, increased incidence of multiple pregnancy, increased incidence of pregnancy-induced-hypertension and the increased percentage of multiparous women who request CS when there is associated medical problem (data not shown), all were factors contributed to the significant increase in cesarean rate for this diagnostic category and in making significant difference with the same diagnostic category in the comparison studies

In conclusion, many factors were contributed to the increase of CS rate, such as the physician style and training, age, parity, race, socioeconomic status, mother request, financial, medico legal considerations, and mainly the increased safety of the operation. The active management of labor, trial of scar, maintenance of the skills required to supervise vaginal delivery when there is a breech presentation and to define better the deliveries in which fetal monitoring will be useful in diagnosis of fetal distress; all are measures by which a lower CS rate can be achieved. In addition, the absence of medico legal pressure and a decrease in performing the procedure for fetuses of less than 30 weeks gestational age plus a trial of labor of fetuses weighing more than 4000 gm were possible factors, which contribute to the minimal changes and lower cesarean rate in Jordan during the last decade.

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