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Prevalence of and risk factors associated with cesarean section in Lebanon — A retrospective study based on a sample of 29,270 women

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ABSTRACT

Background: During the last decades, there has been an alarming and dramatic increase in the number of cesarean births in both developed and undeveloped countries. This increase has not been clinically justified but, nevertheless, has raised an important number of issues.
Aim: The aim of this study was to determine the risk factors associated with the high cesarean section rates in Lebanon.
Methods: This study is based on a sample of 29,270 Lebanese women who were pregnant between 2000 and 2015. Among these, 14,327 gave birth by cesarean section and 14,943 gave birth vaginally. To identify the risk factors of cesarean section, logistic regression was applied as a statistical method using the SPSS statistical package.
Findings: Of the 29,270 pregnant women included in the study, 49% had cesarean sections while 51% gave birth vaginally. Repeat cesarean section accounted for 23% while vaginal birth after cesarean accounted for only 0.2% of deliveries. In addition, weekdays were associated with a preference of providers to carry out more cesarean sections. According to an analysis of our data using logistic regression, the risk factors associated with the increase in cesarean section rates were advanced maternal age, elective cesarean section, malpresentation of fetus, multiple birth, prolonged pregnancy, prolonged labor, and fetal distress.
Conclusion: Based on these results, it is recommended that a new health policy be implemented to reduce the number of unnecessary cesarean deliveries in Lebanon.

Statement of significance

Problem or issue
During the last decades, there has been an alarming and dramatic increase in the number of cesarean births in both developed and undeveloped countries.
What is already known
Some researchers have found that repeat CS, prolonged labor, higher educational level, rise in maternal age, baby weight, length of the baby, and irregular consumption of a balanced diet were risk factors that were significant predictors of CS.
What this paper adds
The risk factors associated with increased CS rates were advanced maternal age, elective CS, malpresentation of fetus, multiple birth, prolonged pregnancy, prolonged labor, and fetal distress.

1. Introduction

Cesarean section, also known as a C-section (CS), is one of the most common operations in the world.[1] It is a surgical procedure that may be performed to deliver one or more newborns. Taking into consideration the rate of CS is important because it reflects the index of health care coverage. Nevertheless, an "optimal" cesarean section rate remains a point of debate. The World Health Organization (WHO) stated in 1985 that the optimum rate should always remain between 10 to 15 percent.[2] However, a new study

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published in December 2015 in the *Journal of the American Medical Association* indicates that if the CS rate increases to 19%, maternal and neonatal mortality decline. Moreover, a CS rate above this level did not lead to any improvement in maternal and neonatal mortality rates.[3]

During the last decades, cesarean deliveries in both developed and developing countries have reached an alarming rate. Based on a study conducted by the WHO in 2008, it is estimated that approximately 18.5 million CS are performed yearly with 69 countries having CS rates above 15%. Each year, 6.2 million unnecessary CS are performed, reaching a total cost of 2.32 billion US dollars.[4] This overuse results in high costs for public-sector services.

Cesarean sections can be associated with benefits to the health of the mother or the child when compared to vaginal birth (VB). CS can be a life-saving intervention including in breech birth, dystocia, and the presence of certain conditions such as placenta previa, diabetes, uterine rupture, and fetal distress. However, like any type of surgery, CS is associated with short- and long-term risks. Many recent studies suggest that CS may be associated with a significant reduction in fertility, as well as an increased risk of maternal morbidity and adverse pregnancy outcome. CS can put women at risk of death, readmission into intensive care units, and even of requiring blood transfusion or encountering serious complications.[6,7]

Since 1990, Lebanon has been ranked as having some of the highest rates of cesarean births among major countries in the Arab World. In 1999 and 2000, 23.3% of births were delivered by C-section,[7] compared to 40.8% in 2010, according to Dejong et al.'s report on cesarean births in Lebanon.[8] At the same time, Vaginal Birth after CS (VBAC), the rate of which is increasing in developing countries and which plays a role in the reduction of repeat CS rate, comprises only 7% of total deliveries in Lebanon.[4] This low rate indicates that women who experience primary CS are more likely to undergo a repeat CS due to the refusal of most doctors to perform a VBAC.[4,6] It is difficult to compare these results to the ones found in other Arab countries as such countries often lack a functional national registration system.[9]

However, the myth that CS is safe is being dispelled by recent report as a result of the increased adverse maternal and fetal outcomes associated with it.[10] The dramatic rise in cesarean rates has been attributed to multiple factors. Many studies have reviewed the factors associated with CS rates, and some researchers have found that the risk of repeat CS, prolonged labor, higher educational level, rise in maternal age, baby weight, length of the baby, and irregular consumption of a balanced diet were risk factors that were significant predictors of CS.[10,11,12] Others have concluded that the increase in obstetrical technology, such as fetal monitoring, may be associated with the increase in CS rates.[12] Obstetric complications such as fetal distress and intrauterine growth restriction have also contributed to this trend.[5,11,17] Finally, a risk factor that has been the focus of many debates and a great number of studies, and that has been encountered in clinical practice worldwide, is maternal request, also known as 'elective CS.' That is why it is necessary to understand the factors that drive the high cesarean section rates, in order to put in place interventions to reduce the current rates. Therefore, the purpose of this study is to analyze the impact of individual risk factors on cesarean births in Lebanon.

2. Participants and methods

2.1. Data source

This is a longitudinal cohort study using a retrospective review of women' files; medical officers' documented indications for each birth were used. The study was conducted through GlobeMed's portfolio, which included pregnant women who gave birth through either cesarean or vaginal birth at Lebanese private or public hospitals. The majority of centers included in our study were private hospitals located in all regions of Lebanon: Beirut, Metn/Baabda, Keserwan/Jbeil, South, North, Bekaa and Chouf/Aley. Between January 2000 and December 2015, 29,878 pregnant women were included in the study.

2.2. Ethics statement

This work is a retrospective study which does not include experimental animals or human patients. For retrospective data analyses no ethical approval is needed.

2.3. Outcomes and variables

Among these women, 14,327 gave birth by CS and 14,943 gave birth by VB. The study population was reduced to only insured Lebanese pregnant women who delivered in Lebanon.

The type of birth coded as dichotomous (cesarean section/vaginal birth) is the dependent variable in this study. The independent variables are categorized as: the day of the birth (weekend/weekday), maternal age group (less than 17 years/18–35 years/36–45 years/46–55 years), region of birth (Beirut/Metn-Baabda/Keserwan-Jbeil/South/North/Bekaa/Chouf-Aley), type of hospital (public/private), and reason for admission linked to the disease code using the ICD10 classification (prolonged labor, fetal distress, previous CS).

2.4. Statistical analysis

An initial bivariate analysis was performed to identify significant associations between types of birth (cesarean vs. vaginal) and independent variables. In order to define the risk factors associated with C-sections, a logistic regression model was used, whereby maternal and other relevant variables were treated as independent variables, while the dependent variables were those mentioned in the above section. All variables were included in the logistic regression, in order to incorporate potential predictors in the final model. In the first analysis, the main focus was to keep only the variables with a p-value less than or equal to 0.25. Then, for the forward selection, a p-value < 0.05 was considered statistically significant. The analyses were carried out using SPSS version 21.

3. Results

It was observed that, in total, 14,327 (49%) live births were delivered by CS; this was above the WHO's recommended rate (15%) from 1985. Among CS births, 6,682 (46.6%) were repeat CS deliveries. Live births accounted for a total of 29,270 births, while only 47 (0.2%) live births were vaginal births after CS (VBAC).

Fig. 1 shows that CS rates have been subject to an increase throughout the years, from 30% in 2000 to reaching as high as 53% in 2015, while VB rates have been decreasing from 69% in 2000 to 47% in 2015. It is true that CS rates are lower than VB rates overall, but the year 2015 had the highest CS rate in our study (53%).

As for the analysis of CS rates in terms of maternal age, the maternal age group "18–35" had the highest number of deliveries (85%), which is reasonable. But, when comparing the types of surgery for each maternal age subgroup, Fig. 2 revealed that C-section rates were higher than vaginal birth rates for mothers aged 36 years and over, whereas CS were lower in the group of mothers aged less than 17 years.

Moving on to the region of birth, Beirut leads in the number of overall deliveries (42%). When comparing the CS and VB rates for

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