



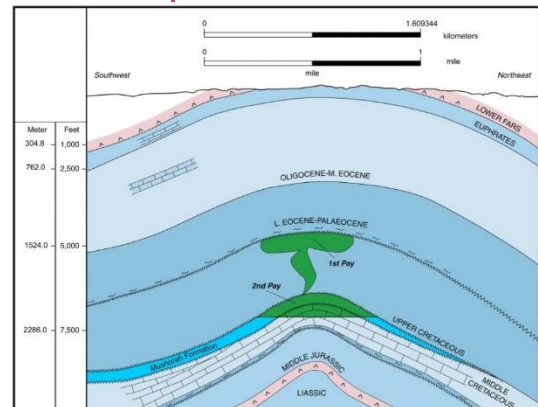
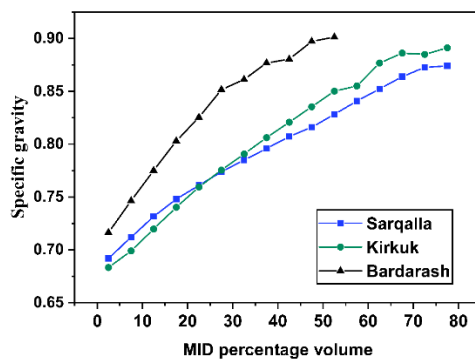
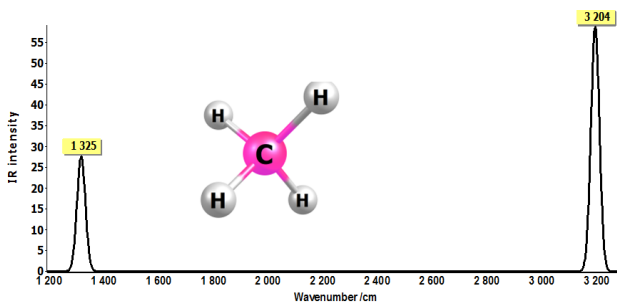
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Indications and Neonatal Outcomes of Caesarean Delivery among Women Attending Maternity Teaching Hospital, Sulaimaniyah City, Iraq

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Abstract

Background: Cesarean section is the most commonly performed surgical procedure in obstetrics, defined as the birth of a fetus via a surgically created incision in the anterior uterine wall. Over the past two decades, there has been a steady rise in the rate of cesarean section delivery globally. As a result, short-term and long-term maternal and neonatal complications are rising. **Objective:** This study aimed to investigate the indications and neonatal outcomes of CS among women attending the Maternity Teaching Hospital in Sulaimaniyah city, Iraq. **Materials and Methods:** This descriptive cross-sectional research was performed on 100 women from 12th December 2021 to 12th April 2022. **Results:** Among participants, 50% were aged >30 years, and three-quarters were housewives. Nearly half of the mothers were multigravida and multipara, in which 64% were emergency, but only 10% underwent CS after delivery induction failure. The utmost common indications of CS were preeclampsia (16%), followed by meconium-stained liquor (12%), non-reassuring fetal heart rate pattern (10%), malpresentation, malposition, and previous C/S (8%). In most newborn babies, Apgar score level was seven and <7 minutes. **Conclusions:** Most CS were emergency and performed for babies at full and post-term. NICU admission was associated with a low Apgar score, respiratory distress syndrome and all indications of CS.

Introduction

Currently, caesarean section (CS) is a potential global maternal health care issue, especially in middle-income/high-income countries (1). Criteria such as the extent of urgency, women's situation and fetal condition are essential for CS classification. Usually, 2 main types of CS are available; elective and emergency. The former CS was defined as the decision was made to do CS ahead of time or before labour (2). However, recently, to prioritize patients, CS has been categorized into emergency (classification I), urgent (classification II), scheduled (classification III), and elective (classification IV) (3).

Based on World Health Organization (WHO), 5 to 15% of CS is the necessary and lifesaving procedure to treat antepartum bleeding, failure labor, uncontrolled hypertension, neonatal suffering or any condition that precludes normal vaginal delivery. CS also is a way to decrease the rate of maternal/neonatal unpleasant/death and fetal distress such as mal-presentation, cephalopelvic disproportion and congenital abnormalities (4).

Surgically, CS is a risk factor to increase the possibility of mother death caused by postpartum haemorrhage, blood transfusion, hysterectomy, and uterine rupture. On the other hand, a uterine scar that mainly leads to placenta previa or placenta accreta in following gravidities is another side effect of CS (5,6).

In comparison to the vaginal delivery, CS can produce more health issues in the mother, such as postpartum fever, operating place infection, puerperal sepsis, as well as in the fetus, including neonatal sepsis, early fetal death, stillbirth, perinatal asphyxia, low Apgar score, and prematurity. In addition, CS is also challenging in terms of patient safety, long hospitalization period, and psychological trauma with higher costs for hospitals and societies (7,8).

Scientifically, the objective of CS is to evade the difficulties that might occur following normal labour. However, it has been stated that CS increases the mother death up to 3 times than vaginal delivery, in which elective and emergency CS also increases mother problems 2 and 5 folds, respectively (9).

Nowadays, strenuous efforts are made to solve CS problems by proposing a trial of labour after caesarean delivery (TOLAC) that can reduce the possibilities of CS by firm follow-up, with suitable suggestions and instrumental delivery utilization. However, these exertions were not considered enough to diminish the impediments (10).

Hence, a study on health outcomes associated with CS and checking the involvement to decrease unrequired CS are important. Unfortunately, up-to-date, few studies on issues determining maternal/neonatal outcomes post CS are available. Therefore, the discovery of the present study may be helpful as input by health care workers and government agencies on actions required to expand excellence of care during pregnancy, labour and delivery. In this regard, this study determined the indications and fetal outcomes of CS among women attending the Maternity Teaching Hospital in Sulaimaniyah city.

Materials and Methods

Participants

Institution-based cross-sectional (non-probability) quantitative (descriptive) study was carried out on the 100 inpatient women who underwent emergency and elective CS for 4 months at Maternity Teaching Hospital, Sulaimaniyah city, from 12th December 2021 to 12th March 2022.

Measurement tools

A well-structured checklist enquiring about maternal and neonatal condition were prepared. The studied variables for each woman that gave birth in the hospital included maternal characteristics; maternal age, age of marriage, level of education, occupation, economic status, residency, antenatal care (ANC) booking status, and space between each pregnancy. Previous obstetric history; gravidity, parity, abortion, death, type of CS and trial of induction. Indications of CS; include medical causes such as (uncontrolled gestational diabetes and preeclampsia), the amniotic fluid causes such as (oligohydramnios and meconium stained liquor), fetal causes such as (non-reassuring fetal heart rate pattern (NRFHRP), malpresentation and malposition, congenital anomalies of the fetus, multiple gestations, and umbilical cord prolapse), placental causes such as (placenta Previa and placenta abruption), uterine causes (uterine rupture, premature uterine contraction, and failure of labour progress), and other causes such as (premature rupture of the membrane (PROM), postdate, history of previous CS and cephalopelvic disproportion). Data regarding newborns' aspects include gestational age, Apgar score at 7 minutes, fetal weight, NICU admission, and respiratory distress syndrome.

Ethical approval

The Scientific and Ethics Committee of the College of Nursing at the University of Sulaimani approved the study proposal. Before collecting data, formal authorization was obtained from health and government authorities.

Consent to participate

The purpose of the current study was explained to the participants, and a written informed consent was obtained. Participation in the study was voluntary, and the included participants have the right to withdraw from the study at any time.

Statistical analysis

The collected data were analyzed by SPSS 24. For this purpose, descriptive statistical methods including frequency, percentage, mean, and standard deviation were employed. Also, inferential statistics like chi-square, Fisher exact test, and Pearson correlation were utilized.

Results

As reported by the statistical department of Maternity Teaching Hospital in Sulaimaniyah city, nearly one-third of the total deliveries were CS (Table 1).

Table 1. Total number of deliveries in Sulaimaniyah city from 2011 to 2020.

Year	Total Delivery	Vaginal Delivery	Caesarean Delivery
2011	15321	10769	4552
2012	16802	11481	5321
2013	18333	12371	5962
2014	19861	13336	6525
2015	20732	13829	6903
2016	18225	12365	5860
2017	15709	10761	4948
2018	13167	8854	4313
2019	13474	8798	4678
2020	12016	7676	4340
Total	163640	110240	53420

In this study, about half (50%) of women were aged < 30 years, with a mean age of 22.3±3.6 years. Three-quarters of the participants were housewives, and their age of marriage was between 18-25 years. Also, 50% of women claimed that their income was sufficient and held institute or higher certificates. In comparison, >58% of studied women lived inside the city, 94% of mothers who underwent CS were registered for ANC in a health organization during present pregnancy, and finally, 36% of participants said their last space between each pregnancy was 3-4 years with a mean of 2.6±1.8 years (Table 2).

Nearly half of the mothers were multigravida and multipara. About 34% and 12% of the study subjects had a previous history of abortion and death, respectively. Most (64%) women underwent emergency/unplanned CS, and only 10% of CS was achieved when labour induction failed (Table 3).

Table 2. Socio-demographic characteristics of study participants experiencing cesarean deliveries.

Maternal Characteristic	Frequency	%
Maternal age (Year)		
< 30	50	50.0
31 - 40	36	36.0
> 40	14	14.0
Mean±SD	22.3±3.6	
Age of marriage (Year)		
< 18	4	4.0
18 – 25	76	76.0
> 25	20	20.0
Mean±SD	32.2±6.8	
Education		
Illiterate	20	20.0
Primary school graduate	32	32.0
Secondary school graduate	4	4.0
Institute or higher	44	44.0
Occupation		
Housewife	74	74.0
Student	2	2.0
Employee	24	24.0
Economic status		
Sufficient	50	50.0
Barely sufficient	38	38.0
Nonsufficient	12	12.0
Residency		
Inside city (urban)	58	58.0
Outside city (rural)	42	42.0
Antenatal care booking status		
Booked	94	94.0
Un booked	6	6.0
Space between each pregnancy		
Primigravida (Year)	16	16.0
1 – 2 Year	30	30.0
3 – 4 Year	36	36.0
5 – 6 Year	18	18.0
Mean±SD	2.6±1.8	
Total	100	100

Table 3. Frequency and percentage distribution regarding previous obstetric history.

Previous Obstetric History	Frequency	%
Gravida		
Prime gravida	16	16.0
Multigravida 2-4	58	58.0
> 4	26	26.0
Para		
Primi para	30	30.0
Multi para	46	46.0
> 4	24	24.0
Abortion		
Yes	34	34.0
No	66	66.0
Death		
Yes	12	12.0
No	88	88.0
Mean±SD	38.0±1.8	
Type of C/S		

Elective	36	36.0
Emergency	64	64.0
Induction trial		
Yes	10	10.0
No	90	90.0
Total	100	100

On the other hand, the most common indications for CS were fetal causes (26%), followed by other causes (20%), medical causes (18%), amniotic fluid causes (14%), uterine causes (12%) and placenta causes (10%). Preoperatively preeclampsia (16%), meconium-stained liquor (12%), NRFHRP (10%), malpresentation, malposition, and previous CS (8%) are the most common causes of indications to perform CS. Other reasons such as placenta Previa, failure of labour progress and PROM constitute 6% of the indications. Also, umbilical cord prolapses, placenta abruptio, premature uterine contraction, and cephalopelvic disproportion account for 4% of indications. Finally, gestational diabetes, oligohydramnios, congenital anomalies of the fetus, multiple pregnancies, uterine rupture and postdate comprise 2% of the indications to perform CS (Table 4).

Table 4. Frequency and percentage distribution regarding indications of cesarean deliveries.

Indications of Cesarean Section	Frequency	%
Medical cause	18	18
Gestational diabetes mellitus	2	2
Pre-eclampsia	16	16
Amniotic fluid cause	14	14
Oligohydraminous	2	2
Meconium stained liquor	12	12
Fetal cause	26	26
NRFHRP	10	10
Malpresentation and malposition	8	8
Congenital anomalies of the fetus	2	2
Multiple pregnancy	2	2
Umbilical cord prolapse	4	4
Placental cause	10	10
Placenta previa	6	6
Placenta abruptio	4	4
Uterine cause	12	12
Uterine rupture	2	2
Premature uterine contraction	4	4
Failure of labor progress	6	6
Other cause	20	20
PROM	6	6
Post date	2	2
Previous C/S	8	8
Cephalopelvic disproportion	4	4
Total	100	100

Furthermore, 46% of CS were performed for babies at complete and post-term pregnancies (>37 weeks of gestation), and 58% of babies were normally weighted. Majority of newborn babies delivered by CS, seven minutes Apgar score level was seven and <7; for that reason, 91% of them were admitted to the NICU for >24 hours, and 53% of them reported respiratory distress syndrome. After delivery, well-looking infants were sent to the NICU, and those with slight respiratory problems stayed 2-3 hours in the NICU (Table 5).

Table 5. Fetal outcomes of women experiencing cesarean deliveries.

Fetal Outcome	Frequency	%
Gestational age (Weeks)		
< 37	36	36.0
37-39	46	46.0
> 40	18	18.0
Apgar score		
< 6	45	45.0
6-7	44	44.0
> 7	11	11.0
Mean±SD	6.5±0.8	
Fetal weight (Gram)		
<2500	28	28.0
2500-3000	58	58.0
>3000	14	14.0
Mean±SD	2669.2±279.6	
NICU admission		
Yes	91	91.0
No	9	9.0
Respiratory distress syndrome		
Yes	53	53.0
No	47	47.0
Total	100	100

Moreover, Table 6 showed a positive association between NICU admission with Apgar score and respiratory distress syndrome, while no association between gestational age and neonatal weight with NICU admission was available. Also, a positive association was found between NICU admissions with all indications of CS (Table 7).

Table 6. Association between fetal outcomes and NICU admission following caesarean deliveries.

fetal outcomes	NICU Admission			P-value
	Yes	No	Total	
Gestational age (Year)				
< 37	30(83.3)	6(16.7)	36(100.0)	0.11
37-39	43(93.5)	3(6.5)	46(100.0)	
40-42	18(100.0)	0(0.0)	18(100.0)	
Fetal weight (gm)				
< 2500	24(85.7)	4(14.3)	28(100.0)	0.32
2500-3000	53(91.4)	5(8.6)	58(100.0)	
> 3000	14(100.0)	0(0.0)	14(100.0)	
Apgar score (Minute)				
< 6	45(100.0)	0(0.0)	45(100.0)	<0.001
6 - 7	39(88.6)	5(11.4)	44(100.0)	
> 7	7(63.6)	4(36.4)	11(100.0)	
Respiratory distress syndrome				
Yes	52(98.1)	1(1.9)	53(100.0)	0.01
No	39(83.0)	8(17.0)	47(100.0)	
Total	91(91.0)	9(9.0)	100(100)	

Table 7. Association between NICU admission and indications following caesarean deliveries.

Indications C/S	NICU Admission		Total	P-value
	Yes	No		
Medical cause	18 (100.0)	0(0.0)	18 (100.0)	0.04
Amniotic fluid cause	12 (85.7)	2(14.3)	14(100.0)	
Fetal cause	26(100.0)	0(0.0)	26(100.0)	
Placenta cause	9(90.0)	1(10.0)	10(100.0)	
Uterine cause	10 (83.3)	2(16.7)	12(100.0)	
Other cause	16(80.0)	4(20.0)	20(100.0)	
Total	91(91.0)	9 (9.0)	100(100)	

Discussion

CS conductance has drastically increased during the past 3 decades to a higher incidence than is supposed to be optimal, mainly due to the primary caesarian delivery and decrease in normal labour after CS. The total rate of this surgery globally has doubled in the past 10 years to 21% and increases annually by 4%. About 6 million needless CS are done yearly, with the highest rate in Brazil and China (11).

In the current study, the data collected on the mother's socio-demographic characteristics revealed that 50% of women were aged >30 years with a mean age of 22.3 ± 3.6 years, 75% were not working, and nearly 50% claimed that their income was sufficient and hold institute or higher certificate. Among 100 included women, 94% experienced CS and were registered ANC. These findings agree with the Mengesha et al., 2019 study in Ayder Specialized Comprehensive Hospital, Ethiopia, which found that most of the mothers that underwent CS were 20-34 years with a median age of 27 years. The same study reported that only 5.3% of women who practised CS were registered for ANC in health institutes, and women who were not registered for ANC were 9.6 times more likely to experience CS than those who had ANC follow-up during pregnancy (12).

Our outcomes also align with the Ayele et al., 2021 study in South Gondar Zone Hospitals, Northwest Ethiopia, which found that 50% of women belonged to the age group of 25–34 years, with the mean age of 27 years. Also, they stated that 50% of women were bachelor's holders or had a higher degree, and 75% who practised CS were housewives (13).

Regarding women's previous obstetric history, in this study, nearly half of the participants were multigravida and multipara. About 34% and 12% of the study subjects had a previous history of abortion and death, respectively. Whereas 64% were emergency CS and only 10% of CS were made after unsuccessful labour induction. These results agree with the Elias et al., 2022 study, which indicated that about 1/4 of the participants who underwent CS were multigravida and multipara. Nearly 10% of study participants had a history of abortion and stillbirth (14). Another recent study conducted at King Abdullah University Hospital (KAUH), Jordan, is in line with our findings and found that 10% of CS was done following unsuccessful labour induction and >50% of CS were planned to be elective among women at term and late preterm gestations (15).

The present study reported that preeclampsia, meconium-stained liquor, NRFHRP, malpresentation/malposition, and previous CS are the most common causes of indications to perform caesarean deliveries. Also, the result of our study showed that placenta previa, umbilical cord prolapses, placenta abruption, cephalopelvic disproportion, gestational diabetes, multiple pregnancy and uterine rupture are other causes of indications to perform CS. These findings are agreed with another study that reported that the main indications for CS were NRFHRP, failed induction and prolapsed umbilical cord (12). On the other hand, these outcomes are similar to another longitudinal study conducted in a tertiary care hospital in India, which observed that most indications for CS were previous CS, NRFHRP, breech presentation, and pregnancy-induced

hypertension (16). Another systematic review and meta-analysis in Ethiopia by Gedefaw et al., (2020) mentioned that the most common indications for performing CS were NRFHRP, malpresentation, unsuccessful labour induction, obstructed labour, and multiple pregnancies (17). Also, Khemworapong et al., 2018 study supports our findings that NRFHRP and umbilical cord prolapse were the most typical indications for CS (18). Also, they mentioned that immediate action might be taken without any hesitation due to the fact that these women are thought to be at higher risks of adverse feto-maternal outcomes. Simultaneously, these findings were supported by Agbozo et al., 2019 study in Ghana, who stated that NRFHRP, malpresentation/malposition, unsuccessful induction, obstructed labour, multiple pregnancies, and cephalopelvic disproportion were the mutual indications of CS (19).

Moreover, the present study showed that 46% of babies delivered by CS were normal weighted at full and post-term. However, most of them had Apgar score levels of seven and <7, which made them be admitted to the NICU. In this respect, Mengesha et al., 2019 revealed that negative fetal distress is a low birth weight (58%), low Apgar score (69%), and 58% of CS were practised at a gestational period of 37 to 40 weeks [12]. Similar to our findings, a recent study by Thomas et al., 2021 reported that the direct neonatal outcomes were fetal distress measured by 5 minutes, Apgar score <7, respiratory distress syndrome, oxygen requirement, period of respiratory support, NICU admission, hospitalization period (20). Opposite to our results was found in a prospective study by Harrison et al., 2017 in Guatemala, India, Kenya, Pakistan, Zambia, and the Democratic Republic of Congo, who mentioned that CS was frequently conducted when the infant's weight was 1500 to 2499 g. They explained that a small-sized fetus most probably had a malpresentation, restricted growth, was born in the situation of hypertension that needed preterm labour or had placental abruption (21).

The present study found a positive association between NICU admission with respiratory distress syndrome and Apgar score. Similar to our finding was reported by other studies, which stated that low Apgar score and respiratory distress syndrome were independently associated with NICU admissions (14,16). Furthermore, finding of the current study revealed a positive association between all indications for CS with NICU admission, which is in line with another study that mentioned that preeclampsia, gestational DM, previous CS, induction trial, PROM, meconium and multiple pregnancies were the most common indicators for NICU admission (15).

Conclusions

We concluded that almost 1/3 of the total deliveries are delivered by CS, and higher CS was reported among housewife women. CS are more common among multigravida and multipara and is performed for full and post-term pregnancies as an emergency. We also found that preeclampsia, meconium-stained liquor, NRFHRP, malpresentation, malposition, and previous CS were the most common indications for caesarean deliveries. A positive association was found between indications of CS and NICU admission. Conversely, CS was associated with adverse fetal outcomes such as low Apgar score and NICU admission. Based on the findings of the present study, CS increased various neonatal/maternal complications; thus, several interventions are needed to target both the education of professionals and the public. Efforts to advance care and outcomes should include more significant investment in training medical and nursing staff to improve labour management, correct the partograph use, and judicious use of oxytocin augmentation in managing prolonged labour to avoid CS.

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