

Early complications of caesarian sections among women delivered in Three Hospitals in Kerbala, 2024

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ABSTRACT

Background: Cesarean section is a lifesaving procedure but carries significant maternal and neonatal risks. Rising rates, often driven by non-medical factors, contribute to complications like hemorrhage, infection, and future pregnancy issues.

Objective of the study: This study aims to investigate the socio-demographic and obstetrical characteristics of women undergoing C-section deliveries, as well as the complications encountered during and after the procedure.

Patients and Methods: A total of 335 pregnant women who underwent caesarean sections were selected using a random sampling approach to ensure a representative sample of post-operative patients. The data collected through structured questionnaire-based interview interviews. Socio-demographic factors, obstetrical and surgical history and complications were collected, categorized and analysed.

Results: Among the 335 cesarean births, many mothers were overweight or anemic, and obstetric complications such as pre-term premature rupture of membranes (PPROM) and postpartum hemorrhage (PPH) were frequent. Surgical and anesthetic mishaps occurred more often in government hospitals. Newborns most often faced jaundice and breathing difficulties, and spinal anesthesia was the technique used in most cases.

Conclusion: Cesarean-related complications are still common, and they occur most often in government hospitals. The problems cluster around three main risk factors: emergency surgery, limited maternal education, and maternal overweight.

Keywords: Caesarian section, Epidemiology, Complications.

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1. INTRODUCTION

Cesarean section has become an increasingly common obstetric operation, been used in many clinical situations and remains a vital part of modern obstetric care worldwide (1).

The World Health Organization's longstanding benchmark is that, at the population level, cesarean deliveries should account for roughly one in ten births and should generally not exceed about 15%, because higher rates have not been shown to further reduce maternal or neonatal deaths (2). The expanding indications for this procedure are one of the hallmarks of modern obstetrics. This is facilitated by the development and improvement of obstetric science, anesthesiology, resuscitation, neonatology, and other factors.. Maternal choice has become an increasingly important factor in deciding whether to pursue a cesarean birth, however, this choice must be balanced with the clinical indications and professional guidance; the current guidelines emphasize that cesarean delivery should primarily be performed when there are obstetric indications . In tandem, improvements in the social determinants of health, enhanced road networks that shorten travel times to hospitals, and the proliferation of for-profit private facilities capable of providing round-the-clock emergency obstetric care have all contributed to the steadily rising global cesarean rate (3,4). Evidence-based guidelines now shape every step of cesarean care. The WHO and other obstetric bodies urge a careful, case-by-case review of indications to avoid unnecessary surgery. At the same time, best practice has shifted toward comprehensive pre- and post-operative care and enhanced recovery protocols that put maternal and newborn outcomes first (5,6). Cesarean birth is sometimes the safest option when specific medical conditions endanger the mother, the baby, or both. Clinicians need a clear grasp of these indications to choose wisely and secure the best outcomes (7). Unnecessary cesarean sections can harm the mother's and the baby's health and wellbeing (8). While a cesarean can be life-saving, it also carries risks. Early post-operative complications can undermine a mother's health, lengthen her recovery, and color her overall birth experience. Recognizing and understanding these complications is essential for refining surgical technique, enhancing post-operative care, and giving patients the information, they need to heal well (9,10). Understanding the risks of this abdominal surgical procedure is essential because it is often performed for non-medical reasons (11).

2. METHODOLOGY

This was a Cross-sectional hospital-based study conducted during the period from November 2023 to December 2024 in three hospitals (One private and two governmental) in Karbala City, middle of Iraq. The two governmental hospitals are the Gynecology and Obstetrics Teaching Hospital in Karbala and the Al-Hindiyah Teaching Hospital in Karbala. The private hospital is Imam Al-Hujjah Hospital.

Study population and sampling

The study population constitute of all women who were delivered by cesarean section at the three selected hospitals. Sample size was calculated using the standard equation of sample size for cross-sectional studies [92]. The net study sample was 335 women and they were randomly selected using a random sampling approach.

The included women were 272 from two governmental hospitals; 152 from Karbala gynecology and obstetrics teaching hospital and 120 from Al-Hindiyah General Hospital and 63 from the private hospital, Imam Al-Hujjah Hospital.

Inclusion criteria

Iraqi women who underwent cesarean sections (elective or emergency) at the three hospitals during the study period regardless the gestational age at time of operation (full-term or pre-term).

Exclusion criteria

Woman presented with intrauterine fetal death, complicated pregnancy and those who did not agreed and signed the informed consent to participate were excluded from the study

Data collection

A detailed pre-constructed data collection form was completed regarding the relevant data which included the demographic data, medical and surgical history, obstetrical history, the registration status of woman in the antenatal care services, type of cesarean section (elective or emergency) and its indication, gestational age at delivery and fetal number.

For purpose of the current study, elective cesarean section was defined as planned procedure without any emergencies, while emergency caesarean sections referred to the procedures that are performed in response to maternal or fetal emergencies.

Data management and analysis

The data analysis was conducted using the Statistical Package for Social Sciences (SPSS Inc., Chicago, Illinois, USA) version 26.0 software for windows. Descriptive statistics presented according to the type of variable; nominal and ordinal variables were expressed as frequency and percentage. Scale variable presented as mean and standard deviation. Chi-square test used to compare qualitative variables at a two tailed level of significance of ≤ 0.05 .

3. RESULTS

The mean age of participant women was 26.74 ± 7.04 years, however, 32.2% of the women at the age group 20–24 years, 25.1% aged between 25–29 years and lower proportions reported in the more advanced age groups. Current smokers contributed for 10.7% of the studied group. Housewives represented 81.2% of participants. More than 74% of the women had primary level of education or lower. Most participants, 91.6%, were residents of Karbala, and 58.5% of urban regions (**Table 1**).

The mean body mass index (BMI) of the participant women was 26.7 ± 7.04 (standard deviation), on the other hand, only 1.5% of participant women were underweight, 29.3% had normal BMI, 34.9% were overweight and 34.3% were obese (**Table 1**).

Obstetrical history of the studied group is summarized in (**Table 2**). However, in the current pregnancy, emergency cesarean section was performed for 187 (55.8%) women and the remaining 148 (44.2%) got elective cesarean sections. The spinal anesthesia used in 193 cases represented (57.6%) of the participant women, (**Table 2**).

Regarding the complications of cesarean sections, the obstetric complications were PPROM (22.1%), antepartum hemorrhage (APH) (10.7%), gestational diabetes mellitus (9.6%), preeclampsia in (8.1%) and eclampsia (6.6%) and HELLP syndrome in 3 cases (0.9%). The reported medical complications were anemia (47.5%), urinary tract infections (UTIs) (21.8%). Both endometritis and venous thromboembolism (VTE) occurred in 14 participants each, representing 4.2% of the studied group. Surgical complications occurred in 128 cases; 54 had postpartum hemorrhage (PPH), 46 wound infection. Subcutaneous wound hematoma at the operative site was occurred in 13 cases. Unfortunately, 6 cases had bladder injury, 5 paralytic ileus and the one case had wound dehiscence and another case had pelvic hematoma. Hysterectomy performed in two cases. Anesthesia related complications, were head ache in

63 (18.8%) cases, back pain in 16 cases (4.8%), hypoxia in 13 (3.9%) cases, sore throat in 12 (3.6%) cases, prolonged recovery from anesthesia 11 (3.3%) cases and difficulty with urination in 8 cases (2.4%), (**Table 4**).

Newborn's complications, were 162 (48.4%) jaundice, 89 (26.6%) respiratory distress and 41 (12.2%) transient tachypnea of the newborn (TTN) (**Table 4**).

Further analysis was performed to compare the maternal and neonatal complications across the included hospitals. Anemia was the more common medical complication in both governmental and private hospitals which was reported in 48.9% and 41.3%, respectively. Urinary tract infections (UTIs) were more common among patients from private hospitals. Endometritis and venous thromboembolism (VTE) were more frequently observed in governmental settings. However, the difference was not statistically significant ($p = 0.25$). The surgical complications were significantly more frequent among patients in the governmental hospitals, ($p = 0.03$).

Anesthesia related complications were significantly different between the two hospital types, and they were more frequent in private hospitals, ($p = 0.02$). For the fetal complications, Jaundice was the most prevalent fetal complication in both settings, affecting 50.0% of neonates in governmental hospitals and 41.3% in private hospitals. Respiratory distress was slightly more common in private hospitals (31.7%) than in government hospitals (25.4%), while transient tachypnea of the newborn (TTN) had nearly equal incidence (12.1% vs. 12.7%). The differences in fetal complications were not statistically significant ($p = 0.63$).

Table 1. Socio-demographic characteristics of the study participants, (n = 335).

Variables		Frequency	%
Age (year)	< 20	43	12.8
	20 - 24	108	32.2
	25 - 29	84	25.1
	30 - 34	65	19.4
	35 - 39	17	5.1
	≥ 40	18	5.4
Smoking Status	Non-smokers	168	50.1
	Passive smokers	129	38.5
	Current Smokers	36	10.7
	Ex-smokers	2	0.6
Occupation	Housewife	272	81.2
	Employed	59	17.6
	Student	4	1.2
Education status	Illiterate	88	26.3
	Read and write	104	31.0
	Primary education	58	17.3
	Secondary education	43	12.8
	Higher Education	42	12.5
Residence province	Karbala	307	91.6
	Babylon	24	7.2
	Baghdad	4	1.2
Residence Type	Rural	139	41.5
	Urban	196	58.5
BMI category	Underweight	5	1.5
	Normal	98	29.3
	Overweight	117	34.9
	Obese	115	34.3

Mean age ± standard deviation: 26.74±7.04 year

Mean BMI ± standard deviation: 28.01±6.06 Kg/m²,

Table 2. Obstetric and surgical history of the study participants, (n = 335).

Variables	Frequency	%
History of miscarriage	102	30.4
History of Vaginal Delivery	71	21.2
Previous Caesarean section	183	54.6
Full-term birth history	311	92.8
Pre-term birth history	41	12.2
PPROM history	75	22.4
Type of Pregnancy		0.0
Natural spontaneous Pregnancy		
Artificial insemination	5	1.5
Ovulation induction	44	13.1
Invitro fertilization	7	2.1
Previous Surgeries	75	22.4
Type of current Caesarean section		0.0
Emergency	187	55.8
Elective	148	44.2
Type of anesthesia		
Spinal anesthesia	193	57.6
General anesthesia	142	42.4
PPROM: Preterm premature rupture of the membrane		

Table 3. Obstetrical complications of the studied group, (n = 335).

Complication	No.	%
PPROM	74	22.1
APH	36	10.7
Gestational diabetes	32	9.6
Preeclampsia	27	8.1
Eclampsia	22	6.6
HELLP	3	0.9
None	141	42.1

PPROM: Preterm premature rupture of the membrane, APH: Antepartum hemorrhage, HELLP: Hemodialysis, elevated liver enzymes and low platelets

Table 4. Maternal and neonatal complications of the studied group, in governmental and private hospitals, (n = 335).

Complication	Government hospitals (n=272)		Private hospitals (n=63)		Total		P. value
	No.	%	No.	%	No.	%	
Medical complications							
Anemia	133	48.9	26	41.3	159	47.5	0.25
UTI	56	20.6	17	27.0	73	21.8	
Endometritis	13	4.8	1	1.6	14	4.2	
VTE	13	4.8	1	1.6	14	4.2	
None	57	21.0	18	28.6	75	22.4	
Surgical complications							
PPH	49	18.0	5	7.9	54	16.1	0.030
Wound infection	38	14.0	8	12.7	46	13.7	
Wound hematoma	13	4.8	0	0.0	13	3.9	
Paralytic ileus	5	1.8	0	0.0	5	1.5	
Hysterectomy	2	0.7	0	0.0	2	0.6	
Pelvic hematoma	1	0.4	0	0.0	1	0.3	
Wound dehiscence	0	0.0	1	1.6	1	0.3	
Bladder injury	6	2.2	0	0.0	6	1.8	
None	158	58.1	49	77.8	207	61.8	
Anesthetic complication							
Back pain	16	5.9	0	0.0	16	4.8	0.020
Headache	56	20.6	7	11.1	63	18.8	
Hypoxia	13	4.8	0	0.0	13	3.9	
Prolonged recovery	8	2.9	3	4.8	11	3.3	
Sore throat	7	2.6	5	7.9	12	3.6	
Difficult urination	7	2.6	1	1.6	8	2.4	
None	165	60.7	47	74.6	212	63.3	
Fetal complication							
Jaundice	136	50.0	26	41.3	162	48.4	0.630
Respiratory distress	69	25.4	20	31.7	89	26.6	
TTN	33	12.1	8	12.7	41	12.2	
None	34	12.5	9	14.3	43	12.8	
UTI: urinary tract infection, VTE: venous thromboembolism, PPH: postpartum hemorrhage, TTN: Transient tachypnea of the newborn							

4. DISCUSSION

In the present study, the socio-demographic profile of the study population highlights several intersecting risk factors—high BMI, passive smoking exposure, low educational attainment, and limited workforce participation—that may influence cesarean section rates and maternal health outcomes. These findings are broadly consistent with regional and international literature, reinforcing the role of social determinants in shaping obstetric care needs. In the present study, 30.4% had experienced at least one miscarriage, this finding close to other studies (12). On the other hand, the relationship between previous miscarriages and subsequent pregnancy complications has been documented in literature (13).

In the current study, the distribution of current cesarean types showed that 55.8% were emergency procedures, while 44.2% were elective. This pattern reflects the broader global trend in developing countries, where emergency cesareans are more prevalent due to delayed labor interventions or limited access to timely monitoring (14,15). Emergency C-sections are usually associated with higher maternal and neonatal risks (16).

However, the present study documented a high prevalence of prior cesarean deliveries, increasing number of PPROM cases, and a substantial proportion of emergency surgeries. When compared to international benchmarks, these patterns highlight the importance of promoting evidence-based vaginal birth after cesarean (VBAC), optimizing antenatal care to reduce preterm and emergency delivery risks, and expanding access to reproductive planning services. These steps are essential to decrease preventable maternal and neonatal morbidity in cesarean deliveries.

Regarding the complications, while cesarean section is often a life-saving procedure, it remains associated with a broad range of complications. Anemia was the most frequently reported medical condition, affecting 47.5% of participants. This prevalence is substantially higher than global postpartum anemia rates (typically around 20–30%) and likely reflects high baseline anemia during pregnancy, compounded by perioperative blood loss. It highlights the need for routine iron supplementation, especially in resource-constrained settings (17,18). Urinary tract infections (UTIs) affected 21.8% of women, which is higher than the rates reported in controlled hospital settings (5–10%) (19). This could be attributed to extended catheterization periods, suboptimal aseptic techniques, or poor hydration postoperatively (20,21). Less

frequent but significant complications such as endometritis (4.2%) and venous thromboembolism (4.2%) emphasize the need for enhanced infection control protocols and thromboprophylaxis, particularly in high-risk patients (22,23).

Surgical complications were reported in 38.2% of participants, with postpartum hemorrhage (16.1%) and wound infection (13.7%) being the most frequent. These rates are higher than those reported in developed countries, where enhanced surgical techniques and prophylactic measures reduce such risks. Wound complications, including hematomas (3.9%) and rare events such as bladder injury (1.8%) which is notably higher than the 0.44% reported by Rahman et al., 2009 (24), reflect the technical challenges associated with repeat surgeries and limited surgical expertise in emergency settings (25).

In our study anesthetic complications were reported in 36.7% of cases, with headache being the most frequent. This is consistent with the known side effects of spinal anesthesia, which was the predominant anesthetic method in this study (57.6%). The incidence aligns with global estimates of post-dural puncture headache (26,27).

Less common complications included back pain (4.8%), hypoxia (3.9%), and sore throat (3.6%)—the latter more common in general anesthesia recipients. The proportion of general anesthesia cases (42.4%) is notably higher than international recommendations, which advocate spinal or epidural anesthesia as the first-line method for cesarean delivery (28).

Neonatal outcomes following cesarean section revealed that jaundice (48.4%) was the most prevalent complication, followed by respiratory distress (26.6%) and transient tachypnea of the newborn (TTN, 12.2%). The high rate of jaundice may also be associated with gestational age, delayed feeding, and maternal-fetal blood group incompatibilities (29).

The findings of this study revealed a wide spectrum of complications associated with cesarean section, many of these complications could be preventable or reducible through better antenatal surveillance, institutional preparedness, and adherence to evidence-based clinical protocols. The high rates of anemia, infection, and fetal complications suggest a need for targeted interventions focused on perioperative care quality, especially in settings with limited resources (30). Furthermore, we compared the incidence of complications across the selected hospitals and found that anemia emerged as the leading medical complication across both settings. Urinary tract infections (UTIs), paradoxically, were more common in private hospitals.

This may be due to longer duration of catheter use or differences in perioperative aseptic protocols (31).

Both Endometritis and venous thromboembolism (VTE) were more frequently observed in government hospitals. These conditions are serious yet preventable with proper postoperative care and early mobilization—interventions that are often delayed in overburdened public facilities. Despite these variations, the overall differences in medical complications between hospital types were not statistically significant ($p = 0.25$).

The study showed a statistically significant difference in surgical complication rates between hospital types ($p = 0.03$). Government hospitals had a higher burden, with postpartum hemorrhage (18.0%) and wound infection (14.0%) being notably more common than in private hospitals (7.9% and 12.7%, respectively). Wound hematomas (4.8%), bladder injuries, and other complications like hysterectomy, paralytic ileus, and pelvic hematoma were exclusive to government settings. Anesthetic complications were also significantly higher in government hospitals ($p = 0.02$). The most frequent complaint—headache—was twice as common in government hospitals (20.6%) compared to private ones (11.1%). Other complications like back pain, hypoxia, and difficult urination occurred exclusively in public facilities, pointing to potential deficits in anesthetic technique, postoperative monitoring, or staffing coverage. Interestingly, sore throat was more common in private hospitals (7.9%) than public ones (2.6%), possibly due to more frequent use of general anesthesia or intubation practices. Fetal complications, unlike maternal ones, did not vary significantly between hospital types ($p = 0.63$).

5. CONCLUSIONS

Cesarean-related complications are still common, and they occur most often in government hospitals. The problems cluster around three main risk factors: emergency surgery, limited maternal education, and maternal overweight.

Ethical approval

The study protocol was approved by the Ethical Committee at the University of Karbala, College of Medicine.

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