

Original Article

Determinants and Outcome of Caesarean Section Deliveries in Kafr-Elzyat General Hospital, Gharbia Governorate

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Abstract

Background: Caesarean section (CS) rates have been steadily increasing worldwide over the last few decades, exceeding levels that are not medically necessary.

Objective(s): To identify the prevalence and determinants of CS deliveries in Kafr-El Zayat General Hospital and the health outcomes of CS deliveries for mothers and neonates within 30 days after delivery.

Methods: A cross-sectional and prospective study was carried out. The study included 500 women aged 17-50 years, who delivered during this period in the gynecology and obstetrics department at Kafr-El Zayat General Hospital.

Results: Among the studied women, 65% delivered by CS. Higher percentages of CS were observed among highly educated women, those from urban areas, and those employed in government sectors. The most frequent obstetric indications for CS were previous CS (30.4%), malpresentation (18.5%), poor outcomes (18%), and failure to progress (7.6%). Non-clinical indications included maternal request (12.9%) and physician's preference (36.9%). Vaginal delivery was associated with better outcomes for both mothers and newborns compared to CS. Significant predictors of the type of delivery included advanced maternal age, higher education levels, passive smoking, previous CS delivery, and presenting in labor upon admission.

Conclusion: The frequency of CS deliveries in Kafr-El Zayat General Hospital, Gharbia Governorate, is highly prevalent and represents a multifaceted challenge.

Keywords: Caesarean Section, Normal Vaginal Delivery, Pregnancy, Gharbia Governorate

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INTRODUCTION

Caesarean section (CS) is a surgical procedure involving the delivery of a baby through an incision in the mother's abdomen and uterus (1). It is typically performed when vaginal delivery poses a risk to the health or life of the mother or baby. According to the World Health Organization (WHO), 10% to 15% of all births worldwide in 2018 required CS due to complications; any rate exceeding 19% is considered excessive (2). Over the past few decades, CS rates have steadily increased worldwide, surpassing medically justifiable levels (3).

In Egypt, the Ministry of Health and Population (2021) reported that unjustified CS deliveries accounted for over 62% of total births that could have been performed naturally. Additionally, the Central Agency for Public Mobilization and Statistics (CAPMAS) documented a 72% increase in CS deliveries in 2021 (4).

The reasons behind the global rise in CS rates are multifaceted, encompassing both clinical and non-clinical factors. Changes in women's risk profiles and a rise in medical and non-medical reasons, including social, cultural, and economic factors, contribute to the increase in CS rates in various contexts (5). In Egypt, residence in lower Egypt, young maternal age, high maternal education level, high socioeconomic level and women delivered 3 or more times were in high risk of CS (4).

While CS can be a lifesaving intervention when medically necessary, it also carries short- and long-term health risks for women and children. For mothers, these risks include infection, significant blood loss, blood clots, injuries to nearby organs such as the bowel or bladder, and adverse reactions to medications or anesthesia (1). The risk of complications increases with the number of CS deliveries, including uterine rupture and placental issues in future pregnancies (6). For babies, CS

delivery can result in breathing difficulties, injuries, and adverse reactions to anesthesia (7).

The economic impact of CS is significant, as it requires more medications, anesthesia, antibiotics to reduce infection risks, medical devices, supplies, lab tests, and blood transfusions compared to vaginal delivery (8). Maternal mortality risk after CS was reported to be five times higher compared to vaginal delivery (9). Given that Egypt has a high rate of unjustified CS deliveries, this study aimed to identify the prevalence and determinants of CS deliveries and to evaluate the health outcomes for mothers and neonates within 30 days post-delivery.

Objectives: To identify the percentage and determinants of CS deliveries in Kafr-Elzyat General Hospital and determine the health outcomes of CS deliveries on mothers and neonates 30 days after delivery.

METHODS

During the study period, this cross-sectional and prospective follow-up study was conducted on 500 females who attended delivery in the gynecology and obstetrics department in Kafr-Elzyat General Hospital. The study was carried out from October 2020 to March 2021 after obtaining approval from the Ethics Committee (approval code: 34055/8/20). Informed written consent was obtained from the participants.

The sample size was calculated using the Minitab statistical program (version 14), with a minimum required sample size of 401 cases based on a probability of 52% (10) and a study power of 90%. To account for a 20% dropout rate, the total sample size was increased to 500 participants. For the cross-sectional study we used the Raosoft Sample Size Calculator with 95% confidence level, 5% margin of error and probability of 50% and the minimum required sample was 377 cases, also for the follow up study we used the same program and the minimum required sample was 453 cases and to potential loss to follow up the final follow up sample increased to 470 cases, with a confidence level of 95%, a margin of error of 5%, power of 80% and an estimated 20% loss to follow up.

Inclusion criteria; all women who attended delivery in the gynecology and obstetrics department in Kafr-Elzyat General Hospital at time of study. There were no exclusion criteria except for females who refused to participate.

All physicians who attended deliveries of the cases enrolled in the study were included in the study. Data were collected by interviewing the cases or their relatives using a predesigned questionnaire developed by the researcher after reviewing relevant literature (11). The questionnaire included sections on complete history taking, clinical examination, and medical

indications for CS, such as malpresentation, fetal distress, multiple pregnancies, cord prolapse, chorioamnionitis, placenta previa, intrapartum hemorrhage, placental abruption, pre-eclampsia, eclampsia, maternal medical conditions, failure to progress, previous CS, uterine rupture, poor obstetric outcomes, previous infertility, and other maternal problems. Non-medical indications for CS included maternal request, social class was assessed indirectly using educational level, occupation and household income, and physician preference. Maternal outcomes assessed by phone calls within 30 days of delivery were death, sepsis, cardiac arrest, shock, hypotension, ileus and bowel obstruction, primary puerperal infection, septic embolism, postpartum hemorrhage, hysterectomy, pulmonary edema, pneumothorax, respiratory failure, amniotic fluid embolism, anesthesia-related complications, deep vein thrombosis, pulmonary embolism, acute renal failure, and the need for mechanical ventilation, among others. Neonatal outcomes also assessed by phone calls within 30 days of delivery included neonatal death, birth injuries, respiratory problems, delayed breastfeeding, hypoglycemia, congenital anomalies, umbilical infection, tetanus, and other infections.

Maternal and infant outcomes were divided to favorable and unfavorable outcomes. Favorable outcomes refer to healthy conditions for both, but unfavorable outcomes refer to complications or health issues for them.

The questionnaire's validity was reviewed by a panel of three experts in public health and community medicine, and a pretest was conducted on 20 participants whose data were not included in the final analysis. The pretest revealed that the items were suitable and easy to complete, with an average time of 10–15 minutes.

Statistical analysis

Statistical analysis was done by SPSS v26 (IBM Inc., Chicago, IL, USA). Quantitative variables were presented as mean and standard deviation (SD) and compared between the two groups utilizing an unpaired Student's t-test. Qualitative variables were presented as frequency and percentage (%) and analyzed using the Chi-square or Fisher's exact test when appropriate. A two-tailed P value < 0.05 was considered statistically significant. Logistic regression was used to determine predictors of CS, unfavorable maternal and fetal outcomes. The regression model was built by using stepwise forward method in SPSS. Variables were added based on statistical significance to identify key predictors.

RESULTS

Approximately two thirds of studied females delivered by caesarean section and 35% by normal vaginal.

Table 1: Regarding maternal sociodemographic data, there was a significant difference between vaginal

delivery and CS in terms of maternal age, residence, and educational level.

Table 1: Sociodemographic characteristics of mothers and mode of delivery

Determinants		Mode of delivery		Total (n= 500) No. (%)	X ^{2**} & FE***	P
		Normal vaginal n=175(No. (%)	C.S. (n= 325) No. (%)			
Maternal age (years)	17-	16 (24.6)	49 (75.4)	65 (13.0)	21.230	<0.0001*
	20-	61 (27.2)	163 (72.8)	224 (44.8)		
	30-	93 (46.3)	108 (53.7)	201 (40.2)		
	40-45	5 (50.0)	5 (50.0)	10 (2.0)		
Residence	Rural	110 (41.8)	153 (58.2)	263 (52.6)	11.361	0.001*
	Urban	65 (27.4)	172 (72.6)	237 (47.4)		
	Illiterate	29 (70.7)	12 (29.3)	41 (8.2)		
Educational level	Read and write	39 (38.6)	62 (61.4)	101 (20.2)	32.754	<0.0001*
	Primary	6(31.6%)	13 (68.4)	19 (3.8)		
	Secondary	81 (33.5)	161 (66.5)	242 (48.4)		
	University	20 (20.6)	77 (79.4)	97 (19.4)		
	Housewife	99 (38.1)	161 (61.9)	260 (52.2)		
Occupation	Unskilled manual worker	22 (39.3)	34 (60.7)	56 (11.3)	5.079	0.166
	Skilled manual worker	38 (29.7)	90 (70.3)	128 (25.7)		
	Governmental employee	14 (25.9)	40 (74.1)	54 (10.8)		

*Significant, **chi-square, ***Fisher exact test

Table 2: All women with a history of previous CS and most women with a history of intrauterine fetal death delivered by CS, including 91.7% of women with a history of reproductive intrauterine fetal death. The rate of CS delivery was highest among women in their first and fifth parities (81.0% and 78.6%, respectively) compared to those in their second, third, and fourth parities (64.7%,

55.8%, and 46.2%, respectively), with a significant difference observed between the groups. Additionally, the majority of nulliparous women (81.0%) and all women with a history of previous CS were delivered by CS, compared to only 28.6% of women with a history of previous normal delivery, with a significant difference between the groups.

Table 2: Distribution of past and current obstetric history among the study group

Determinants		Mode of current delivery		Total (n= 500)No. (%)	X2** & FE***	P
		Normal vaginal (n=175) No. (%)	C.S. (n=325) No. (%)			
Past obstetric history						
Past reproductive history	Infertility	0 (0.0)	4 (100.0)	4 (0.8)	1.625	0.202
	Abortion	19 (51.4)	18 (48.6)	37 (7.4)	5.162	0.023*
	Intrauterine fetal death	1 (8.3)	11 (91.7)	12 (2.4)	6.506	0.014*
	Previous cesarean	0 (0.0)	152 (100.0)	152 (30.4)	78.945	<0.0001*
Parity	Previous vaginal	147 (71.4)	59 (28.6)	206 (41.2)	191.110	<0.0001*
	Once	28 (19.0)	114 (81.0)	142 (28.4)	30.136	<0.0001*
	Twice	48 (35.3)	88 (64.7)	136 (27.2)		
	Third	68 (44.2)	86 (55.8)	154 (30.8)		
	Fourth	27 (53.8)	24 (46.2)	51 (10.3)		
	More than fourth	4 (23.5)	13 (76.5)	17 (3.3)		
	Gravidity	Once	33 (21.9)	118 (78.1)	151 (30.2)	22.421
Twice		43 (34.4)	82 (65.6)	125 (25.0)		
Third		62 (40.8)	90 (59.2)	152 (30.4)		
Fou87rth		27 (52.9)	24 (47.1)	51 (10.2)		
More than fourth		10 (47.6)	11 (52.4)	21 (4.2)		
Mode of previous delivery	Normal vaginal	147 (71.4)	59 (28.6)	206 (41.2)	191.110	<0.0001*
	Cesarean	0 (0.0)	152 (100.0)	152 (30.4)	78.945	
	Nulliparous	28 (19.0)	114 (81.0)	142 (28.4)	22.060	
Current obstetric history						
Medical history during pregnancy (not mutually exclusive)	HTN	18 (52.6)	17 (47.4)	35 (7.0)	3.608	0.058
	DM	8 (49.8)	9 (50.2)	17 (3.4)	1.328	0.249
	Other Chronic disease	8 (44.4)	10 (55.6)	18 (3.6)	0.438	0.508
	37	1 (1.3)	75 (98.7)	76 (15.2)	57.194	<0.0001*
Gestational age (weeks) at delivery	38	48 (31.8)	103 (68.2)	151 (30.2)		
	39	61 (44.5)	76 (55.5)	137 (27.4)		
	40	56 (45.5)	67 (54.5)	123 (24.6)		
	41	9 (66.7)	4 (33.3)	13 (2.6)		
Fetal presentation at delivery	Normal cephalic	175 (40.2)	260 (59.8)	435 (87.0)	40.943	<0.0001*
	Abnormal presentation	0 (0.0)	65 (100.0)	65 (13.0)		

*Significant, **chi-square, *** Fisher exact test, DM: Diabetes mellitus, HTN: Hypertension

Figure 1 : Regarding obstetric indications for CS, the most common was a history of previous CS (30.4%), followed by malpresentation (18.5%). For

non-clinical indications, physician requests accounted for 36.9%, while maternal requests represented 12.9%.

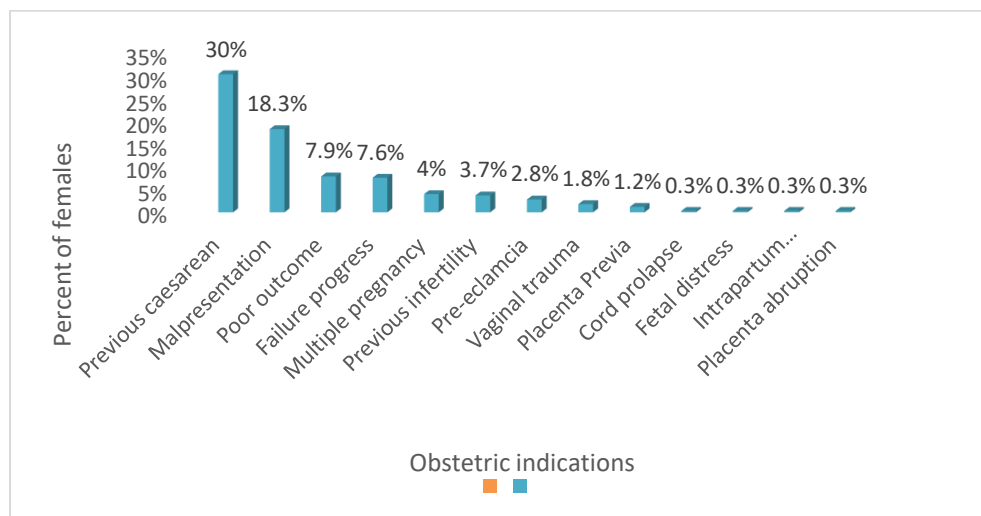


Figure 1: Distribution of the frequencies of indications of current CS among the study group

Table 3: About 5% of women who delivered by normal vaginal delivery experienced puerperal sepsis, compared to 13.8% of those who delivered by CS, showing a significant difference. More than 3% of women who delivered vaginally experienced hypotension, compared to 11.4% of those who delivered by CS, also with a significant difference.

Around 90% of women who delivered vaginally did not experience any unfavorable outcomes, compared to only 38.6% of those who delivered by CS. Additionally, about two-thirds (61.6%) of women who delivered by CS experienced adverse outcomes, compared to 10.3% of those who delivered vaginally, with a significant difference between the groups.

Table 3: Distribution of maternal outcome in women with normal and caesarean delivery

Outcome	Mode of current delivery		Total (n=500) No. (%)	X ^{2**} & FE***	P
	Normal vaginal (n=175) No. (%)	C. S. (n=325) No. (%)			
- Puerperal sepsis	8 (4.6)	45 (13.8)	53 (10.6)	20.948	<0.0001*
- Hypotension	6 (3.4)	37 (11.4)	43 (8.6)	17.803	<0.0001*
- Postpartum hemorrhage	1 (0.6)	13 (4.0)	14 (2.8)	0.119	0.730
- Maternal death	2 (1.1)	10 (3.1)	12 (2.4)	10.137	0.001*
- Deep vein thrombosis	1 (0.6)	6 (1.8)	7 (1.4)	0.218	0.640
- Anesthesia complications	0 (0.0)	54 (16.6)	54 (10.8)	0.00	0.984
- Paralytic ileus	0 (0.0)	24 (7.4)	24 (4.8)	0.351	0.553
- Hysterectomy	0 (0.0)	5 (1.5)	5 (1.0)	8.366	0.004*
- Renal failure	0 (0.0)	3 (0.9)	3 (0.6)	0.135	0.713
- Pulmonary embolism	0 (0.0)	2 (0.6)	2 (0.4)	0.019	0.891
- Respiratory failure	0 (0.0)	1 (0.3)	1 (0.2)	0.028	0.867
- Favorable	157 (89.7)	125 (38.6)	282 (56.4)	408.535	<0.0001*
Maternal outcome					
	Favorable outcome (n=282) No. (%)	Unfavorable outcome (n=218) No. (%)	Total (n=500) No. (%)		
Mode of current delivery					
- Normal vaginal	157 (89.7)	18 (10.3)	175 (35.0)	121.5	<0.0001*
- C. S	125 (38.4)	200 (61.6)	325 (75.0)		

*Significant, **chi-square, *** Fisher exact test, CS: Caesarean section

Table 4: Among infants of women who delivered vaginally, 6.3%, 9.2%, and 9% experienced delayed breastfeeding, breastfeeding failure, and jaundice, respectively, compared to 38.8%, 29.5%, and 24% of infants delivered by CS, with a significant difference between the groups. Respiratory problems were reported in 4% of infants delivered

vaginally, compared to 13.2% of those delivered by CS, also showing a significant difference. Infant mortality was four times higher among those delivered by CS compared to vaginal delivery, with a significant difference observed. Approximately two-thirds of infants born to women who delivered vaginally had favorable

outcomes, compared to only 8.6% of those delivered by CS.

Table 4: Distribution of fetal outcome and mode of delivery

Determinants	Mode of current delivery		Total (n= 500) No. (%)	X ^{2**} & FE***	P
	Normal vaginal (n=175) No. (%)	C. S. (n=325) No. (%)			
Fetal outcome					
- Delayed breastfeeding	11 (6.3)	126 (38.8)	137 (27.4)	13.726	<0.0001*
- Failure breastfeeding	16 (9.2)	96 (29.5)	112 (22.4)	22.443	<0.0001*
- Jaundice	15 (8.6)	78 (24.0)	93 (18.6)	10.066	<0.0001*
- Respiratory problems	7 (4.0)	43 (13.2)	50 (10.0)	15.390	<0.0001*
- Umbilical infection	6 (3.4)	15 (4.6)	21 (4.2)	65.113	<0.0001*
- Death	2 (1.1)	14 (4.3)	16 (3.2)	7.187	0.007*
- Other infections	49 (2.3)	9 (2.8)	13 (2.6)	53.671	<0.0001*
- Birth injury	3 (1.7)	5 (1.5)	8 (1.6)	0.251	<0.0001*
- Cardiac problem	0 (0.0)	15 (4.6)	15 (3.0)	0.251	0.617
- Hypoglycemia	0 (0.0)	3 (0.9)	3 (0.6)	0.047	0.828
- Favorable	111 (63.4)	28 (8.6)	139 (27.8)	315.217	<0.0001*
Fetal outcome					
	Favorable outcome (n=129)	Unfavorable outcome (n=371)			
- Normal vaginal	111 (63.4)	64 (36.6)	175 (35.0)	315.217	<0.0001*
- C. S	28 (8.6)	297 (91.4)	325 (75.0)		

*Significant, **chi-square, ***fisher exact test Caesarean section.

Table 5: High maternal age, higher education, passive smoking, a history of previous CS, and adverse maternal conditions at labor upon hospital admission were identified as significant predictors of cesarean delivery. Current cesarean delivery, a history of previous CS, labor upon admission, and abnormal fetal presentation were significant

predictors of adverse maternal outcomes. Additionally, urban residence, higher maternal education, maternal habits (e.g., smoking), a history of previous vaginal delivery, abnormal fetal presentation, labor upon admission, and increased gravidity were significant predictors of adverse fetal outcomes.

Table 5: The predictors of CS, unfavorable maternal and fetal outcomes among the study group (using logistic regression analysis)

Variables	B	S.E.	Wald	DF	Sig.	Exp (B)
Predictors of C. S.'s						
- Maternal age	-0.642	0.143	20.201	1	<0.0001*	0.526
- Maternal high education	0.459	0.085	29.231	1	<0.0001*	1.582
- Maternal passive smoking	0.529	0.226	6.858	1	0.009*	1.807
- CS as a last delivery	5.427	0.758	51.199	1	<0.0001*	227.376
- Bad status on admission	4.782	0.768	38.769	1	<0.0001*	119.500
- Constant	0.338	0.107	9.960	1	0.002*	1.403
X ² 25.627				DF 1	Sig. <0.0001*	
Predictors of maternal outcome						
- CS delivery	7.132	0.748	90.910	1	<0.0001*	1251.625
- Previous cesarean delivery	-2.896	0.254	130.336	1	<0.0001*	0.055
- Poor medical condition upon arrival	4.520	0.720	39.442	1	<0.0001*	91.815
- Abnormal fetal presentation	2.024	0.582	12.088	1	0.001*	7570
- Constant	0.781	0.096	65.776	1	<0.0001*	2.185
X ² 473.529				DF 1	Sig. 0.00*	
Predictors of fetal outcome						
- CS delivery	6.738	1.016	44.570	1	<0.0001*	882.382
- Urban residence	0.613	0.218	7.880	1	0.005*	1.846
- Maternal education	0.348	0.088	15.727	1	<0.0001*	1.416
- Maternal habits	0.653	0.243	7.202	1	0.007*	1.921
- Previous vaginal delivery	-2.759	0.275	100.811	1	<0.0001*	0.063
- Abnormal fetal presentation	17.462	2720.091	0.00	1	0.995	66.040
- Poor medical condition upon arrival	4.190	0.722	33.704	1	<0.0001*	66.040
- Increase gravidity	-0.352	0.090	15.385	1	<0.0001*	0.704
- Constant	-7.785	1.058	54.133	1	<0.0001*	0.00*
X ² 127.124				DF 1	Sig. <0.0001*	

Significant p-value <0.05. X²: Chi-square test, CS: Caesarean section, Exp B: Exponential was alternative to adjusted odds ratio, S.E: standard error, DF: direction finding.

DISCUSSION

Worldwide, CS rates have risen significantly, according to the latest available data 2018 from 154 countries, covering 94.5% of global births, increasing from 7% in 2000 to 21% in 2018 (12).

The findings of this study align with previous research regarding the indications and maternal outcomes associated with CS compared to normal deliveries, so the rise in our current study reflects global trend and also factors applied locally. A study by Richmond et al. in Ontario, Canada 2018 reported that 87.6% of females with a history of infertility delivered by CS, likely due to concerns about the baby's well-being, as these pregnancies were considered "precious" (13). In the current study, the majority (81.0%) of nulliparous women and all women with a history of CS in previous deliveries were delivered via CS, compared to 28.6% of women with a previous normal delivery, with significant differences between the groups. Similarly, a study by Rabie et al. (12) reported that 38.4% of nulliparous females were delivered by CS.

This study also found that the most common indications for CS were the history of previous CS, followed by fetal malpresentation. Similarly, Elnakib et al. Egypt 2019 (14) reported that the most frequent indication for CS was a prior CS. Additionally, the current study revealed that infertility and previous poor obstetric outcomes were indications for CS in 3.8% and 8.0% of cases, respectively. This aligns with findings by Pearl et al. USA 2022 (12), who reported that mothers with previous poor obstetric outcomes, such as infertility, abortion, or intrauterine fetal death, often preferred CS due to its lower risk of trauma and infection to the infant compared to vaginal delivery.

In the current study, cesarean deliveries performed at the maternal request accounted for 12.9% of all CS cases that may be due to fear of labor, convenience, misinformation or defensive medical practice. In comparison, a study by Begum (16) reported that maternal requests for CS may represent up to 42% of all CS deliveries this difference between this study and our one may be due to lower autonomy, strong physician influence or culture difference. Additionally, the current study found that physician requests, without obstetric indications, accounted for 36.9% of CS deliveries. Similarly, Rivo et al. Argentina 2018 (17) reported that physician requests without medical justification represented 30.4% of CS deliveries as physicians believed that CS could better controlled the timing and reduce risks during delivery.

Regarding maternal outcomes, the findings of the current study are consistent with previous research. For instance in Ethiopia, Bishaw et al. (15) reported that 17.3% of females who delivered by CS

experienced puerperal sepsis compared to 3.7% of those who delivered vaginally, showing a significant difference, that was due to surgical wounds and catheter use.

In the present study, 11.4% of women delivered by CS suffered from hypotension compared to 3.4% of those who delivered vaginally, with significant differences observed. Similarly, a study in Ethiopia 2020 by Shitemaw et al. (18) found that 64% of women who delivered by CS experienced hypotension following spinal anesthesia as high use of spinal anesthesia leads to vasodilatation. In agreement with the findings on delivery mode and complications, Pettersen et al. in Norway 2017 (19) reported that postpartum hemorrhage occurred in 8.5% of females who delivered by CS, compared to 5.1% of those who delivered vaginally due to uterine atony after CS or surgical bleeding.

In agreement with our findings on maternal death, Kalliandis et al. (20) reported that maternal mortality after CS was three times higher than after normal vaginal delivery, with significant differences observed could be due to surgical risks, anesthesia or delayed recovery, this study was carried out in Netherland 2018.

Regarding fetal outcomes, in Bangladesh 2019, Mostafizur et al. (21) found that 83% of infants born to women who delivered by CS experienced breastfeeding problems compared to 37% of those delivered vaginally, that may be due to delayed lactation initiation, with significant differences noted. A study by Tavakolizadeh et al. in Iran 2018 (22) reported that neonatal jaundice was one of the most common reasons for neonatal hospital readmission, affecting 60% of full-term neonates and 80% of preterm neonates delivered by CS. Similarly, a study in China by Wang et al. 2023 (23) found that 20% of infants born via CS developed respiratory asthma compared to 6% of those born vaginally, it may be due to lack of hormonal and mechanical changes associated with vaginal delivery. with significant differences between the groups this study. In Minya Governorate 2019, Hashem F et al. (24) showed that more than 20% of neonates delivered by CS were admitted to the intensive care unit due to sepsis. Additionally, neonates born by CS were found to have a 10% higher risk of infections requiring hospitalization than those born vaginally, with these risks persisting for up to five years as CS may compromise neonatal immunity or expose infants to nosocomial infections. A study carried out in India 2020 by Gondwe T. et al. (25) also reported an association between CS and neonatal death, with 1.8% of neonates born via CS succumbing to complications.

Regarding predictors of CS, the current study identified advanced maternal age, higher education levels, smoking, previous CS, and maternal condition

upon hospital admission as significant predictors of cesarean delivery, with notable differences observed. Similar findings were reported by Zhang et al. Beijing, China 2017 (26), who identified advanced maternal age, gestational age, and CS as the last mode of delivery as significant predictors of delivery type. Additionally, study by Khan MN et al. in Bangladesh 2017 (27) reported that advanced maternal age, higher education levels, and urban residence were predictors of cesarean delivery, may indicate that access to healthcare, awareness and lifestyle factors play a role in the decision or recommendation for CS.

Regarding maternal outcome predictors, the current study identified current CS delivery, previous CS, women in labor upon admission, and abnormal fetal presentation as significant predictors of adverse maternal outcomes as these factors increased procedural complexity and obstetric risk. Similarly, a study done in Ethiopia 2019 by Mengesha et al. (28) reported that advanced maternal age, increased parity, previous CS, older physicians, women in labor on admission, poor maternal medical conditions, and gestational age beyond 39 weeks were significant predictors of adverse maternal outcomes.

Concerning fetal outcome predictors, the current study found that CS delivery, urban residence, higher maternal education, maternal habits (e.g., smoking), previous vaginal delivery, abnormal fetal presentation, maternal condition on admission, and increased gravidity were significant predictors of adverse fetal outcomes. In line with this, Mengesha et al. Ethiopia 2019 (28) also identified advanced maternal age, a higher number of previous CS deliveries, and poor maternal medical histories, such as hypertension and obstructed labor, as significant predictors of adverse fetal outcomes.

Limitations of the study

Included that the study was conducted at a single center, which may limit the generalizability of the findings. Additionally, the COVID-19 pandemic affected the data collection process, necessitating an extension of the data collection period beyond six months.

CONCLUSION AND RECOMMENDATIONS

The study found a high rates of CS, with common obstetric indications including previous CS, fetal malpresentation, poor outcomes, failure to progress, multiple pregnancies, previous infertility, pre-eclampsia, and placenta previa, and the non-obstetric indications included maternal requests and physician requests also contributed. Key factors associated with undergoing CS were Advanced maternal age, high education, passive smoking, CS as the last mode of delivery, and labor on admission. Poor maternal

outcomes were linked to CS, history of vaginal or cesarean delivery, labor at admission and fetal malpresentation. Similarly adverse fetal outcomes were associated with CS, urban maternal residence, higher maternal education, prior vaginal delivery and high gravidity.

We recommend conducting childbirth training workshops for women and couples to promote informed decision-making, implementing clinical practice guidelines with a mandatory second opinion for CS indications supported by an effective audit system, raising physician awareness about proper indications for CS through evidence-based practices, and organizing comprehensive training programs for nurses and midwives to assist women during vaginal delivery and improve maternal and fetal outcomes.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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