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Factors Associated with the Incidence of Cesarean Section at Alkhums Teaching Hospitals Libya

Nisreen Abufaris [1], Mohamed Sryh [1*]
[1] Family and community medicine department, Faculty of Medicine, Elmergib University, Alkhums, Libya

العوامل المرتبطة بمعدلات الولادة القيصرية في مستشفيات الخمس التعليمية ليبيا

نسرين ابوفارس[1]، محمد اسريح[1*]
[1]قسم طب الاسرة والمجتمع، كلية الطب البشري، جامعة المرقب، الخمس، ليبيا

*Corresponding author: mssryh@elmergib.edu.ly

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Abstract:
The cesarean section is one of the most performed surgeries, it is a lifesaving procedure when performed in the right situation. Several factors related to mothers were found to have direct effects on the incidence of cesarean section as maternal age and some medical conditions like a past obstetric history of mothers with previous cesarean delivery. WHO has determined the normal range for cesarean deliveries at 5-15 % of all deliveries, globally cesarean rates excessed this range for high levels. This case-control study aims to investigate a group of factors that may influence these high rates of cesarean sections at Alkhums teaching hospitals. 149 cases and 144 control were involved in the analysis to test the effect of several factors on type of delivery, we found that factors like age >30 (OR=1.7), a previous cesarean delivery (OR=19), doctor decision (OR=212) and patient decisions (OR=3.9), daytime of admission (OR=4.6), labor signs at home (OR=17.4), non-cephalic fetal presentation (OR=12), ruptured membranes (OR=2.2) were significantly associated with cesarean section. Other factors such as gestational hypertension, fetal distress, and third trimester bleeding were found to be insignificant. Conclusion: findings indicate that the high rates of cesarean sections are not primarily linked to major medical indications for life-saving interventions for either the mother or the fetus. Instead, controllable factors, such as the decisions made by doctors and mothers.

Keywords: Cesarean section, Vaginal delivery, Alkuhms, Libya.

الملخص
تعتبر عملية الولادة القيصرية من أكثر العمليات الجراحية التي يتم إجراؤها، وهي إجراء منقذ للحياة عندما يتم إجراؤه في الوضع الصحيح. وقد وجد أن العديد من العوامل المتعلقة بالأمهات لها تأثيرات مباشرة على حدوث عملية الولادة القيصرية مثل عمر الأم وبعض الحالات الطبية مثل التاريخ التوليدي السابق للأمهات اللاتي خضعن للولادة القيصرية سابقًا. حددت منظمة الصحة العالمية النطاق الطبيعي للولادات القيصرية بنسبة 5-15٪ من جميع الولادات، وتجاوزت معدلات الولادة القيصرية على مستوى العالم هذا النطاق بمستويات عالية. تهدف دراسة الحالات والشواهد هذه إلى التحقيق في مجموعة من العوامل التي قد تؤثر على هذه المعدلات المرتفعة من عمليات الولادة القيصرية في مستشفيات الخمس التعليمية. تم إجراء التحليل على 149 حالة و144 حالة تحكم لاختبار تأثير العديد من العوامل على نوع الولادة، ووجدنا أن عوامل مثل العمر >30(*OR=1.7*) ، والولادة القيصرية السابقة(*OR=19*) ، وقرار الطبيب (*OR=212*) وقرارات المريضة (*OR=3.9*)، ووقت الدخول إلى المستشفى(*OR=4.6*) ، وعلامات المخاض في المنزل(*OR=17.4*) ، ووضع الجنين غير الرأسي(*OR=12*) ، وتمزق الأغشية (*OR=2.2*) كانت مرتبطة بشكل كبير بالولادة القيصرية. ووجد أن عوامل أخرى مثل ارتفاع ضغط الدم الحملي، وضائقة الجنين، والنزيف في الثلث الثالث من الحمل كانت غير ذات أهمية. الاستنتاج:

تشير النتائج إلى أن المعدلات المرتفعة للولادة القيصرية لا ترتبط في المقام الأول بالمؤشرات الطبية الرئيسية للتدخلات المنقذة للحياة للأم أو الجنين. بدلاً من ذلك، هناك عوامل يمكن التحكم فيها، مثل القرارات التي يتخذها الأطباء والأمهات.

الكلمات المفتاحية: الولادة القيصرية، الولادة المهبلية، الخُمس، ليبيا.

Introduction

Cesarean section is one of the most commonly performed surgeries [1], it is a lifesaving procedure When performed in the right situation [2], several factors related to mothers were found to have direct effects on the incidence of cesarean section as maternal age, also some medical conditions like a past obstetric history of mothers with previous cesarean delivery, the presence of any chronic condition as hypertension, preeclampsia, vaginal bleeding and gestational diabetes, fetal breech presentation and preterm can lead to cesarean delivery [3,4], besides that CS carries out many serious complications, abnormal placentation like these conditions dramatically increase maternal mortality and morbidity repeated CS leads to pelvic adhesions which may cause infertility in some cases [5]. The rates of cesarean sections increased in the last decade [6], WHO has determined the normal range for cesarean deliveries at 5-15 % of all deliveries, globally cesarean rates excessed this range for high levels, especially in Latin America, Europe, and North America [1], in Libya rates of cesarean deliveries in 1996 was 7.6% of all deliveries, but at the last years, this rate highly increased to reach 47% of all deliveries by the year 2019. At Alkhums City rate of cesarean deliveries was about 37% of total deliveries at teaching hospitals, which exceeds the normal considerations [7]. No studies show the reasons for these high rates in Alkhums City and whether they applied for medical or non-medical reasons, whereas cesarean section has many complications it should be performed only for medical reasons [8]. Our study aims to investigate a group of factors that may influence these high rates of cesarean section at Alkhums teaching hospitals and to find out the strength of the effect of different factors.

Manyeh et al. (2018) conducted a study to identify the rate of cesarean sections and associated factors in two districts in rural southern Ghana. They obtained information related to pregnancy, birth, and socio-demographic data from 4,948 women who gave birth between 2011 and 2013, using the database of the Dodowa Health and Demographic Surveillance System. The results revealed that the overall cesarean section rate for the study period was 6.59%. They found that women aged 30–34 years were more than twice as likely to have a cesarean section compared to those under 20 years. The odds of having a cesarean section were 65% and 79% higher for participants with primary and junior high-level schooling, respectively. Furthermore, the likelihood of having a cesarean delivery decreased by 60%, 37%, and 35% for women with parities of 2, 3, and 4 or more, respectively. There were increased odds of 36%, 52%, and 83% for women belonging to poorer, middle, and richer wealth quintiles, respectively. Participants who belonged to the richest wealth quintile were more than twice as likely to have a cesarean delivery. Additionally, women whose household heads had a junior high level of education or higher were 45% more likely to have a cesarean delivery. The study concluded that the mother's age, educational level, parity, household socioeconomic status, district of residence, and the level of education of the household head are associated with cesarean section delivery [9].

Carine Milcent (2008-2014) aimed to examine the impact of prenatal care on cesarean section rates and the effect of the socioeconomic status of participants on attending prenatal care. Data were obtained from French delivery records in the Yvelines administrative district, which included demographic information, household socioeconomic status, prenatal care, hospital stay, place of birth, type of delivery, and maternal, fetal, and neonatal health data. This study showed that women who do not participate in prenatal education have an increased probability of cesarean delivery compared to those who do. Furthermore, the study indicated that attendance at prenatal education varies according to socioeconomic status, with low socioeconomic women being more likely to have cesarean deliveries and less likely to participate in prenatal education. These results emphasize the importance of focusing on pregnancy health education, particularly for low-income women, as a potential way to limit unnecessary cesarean deliveries [10].

Muhammad Fawad (2019-2020) conducted a cross-sectional study to assess the frequency of cesarean sections and their contributing factors. Data were collected through interviews with participants regarding social data, gestational age, educational level, and pregnancy complications such as gestational diabetes, hypertension, and vaginal bleeding. Investigators found a significant association between high rates of cesarean sections and young age mothers, pre-term gestational age, and various pregnancy complications including gestational diabetes, hypertension, preeclampsia, and vaginal bleeding. These risk factors could be addressed by implementing community-focused educational interventions during the gestational period [3].

Smrity Maskey (2019) aimed to find the prevalence of cesarean sections and the most common indications at KIST Medical College and Teaching Hospital in Imadole, Lalitpur. Data were collected using a self-structured questionnaire designed for the study's target population, which consisted of pregnant women admitted to the hospital. The results indicated that 36.8% of deliveries were cesarean and 63.1% were vaginal. The most common indication for cesarean sections during the two-year study was fetal distress (28%), followed by previous cesarean section (18%), non-progress of labor (12%), oligohydramnios (7%), malpresentation (7%), cephalopelvic disorder (6.5%), and hypertensive disorder in pregnancy (4%). Therefore, the most common indications for cesarean section were fetal distress and previous cesarean delivery [11].

Moeun Son (2008-2011) examined whether cesarean section rates vary by the time of day. This was a secondary analysis of a large multicenter observational study conducted at 25 hospitals in the United States. All nulliparous women with term, singleton, vertex presentations were included, while mothers who underwent elective cesarean sections were excluded. The study found that mothers who underwent cesarean sections for indications such as labor dystocia, non-reassuring fetal status, and cervical dilation of less than 5 cm exhibited variations based on the time of day. The time for cesarean sections decreased from midnight (21.2%) to morning (17.9%) and increased in frequency, peaking at 21:00 (26.2%) [12].

Material and methods

This case-control study was conducted from Dec. 2019 to Mar 2020 at Alkhums teaching hospital and Suoq-Alkhems Al khums Maternal and childcare center, in this study cesarean section deliveries were defined as cases where vaginal delivery cases were controls. The study was designed to include 240 cases and 240 controls. all cesarean section cases and the majority of vaginal deliveries occurred one day before the interview some vaginal deliveries involved occurring on the same day.

Data were collected in interviews with mothers in maternity wards after 6 to 48 hours of delivery, informed consent was obtained from subjects before interviews. Data was collected from the women on socioeconomic and demographic characteristics, reproductive history, prenatal care, adverse gestational or labor events, preference for cesarean, request for cesarean, and women's perception of signs of labor when leaving home for the hospital, admission characteristics, labor management, and time of birth were recorded.Bivariate analysis was performed to analyze association between independent factors and type of delivery using IBM SPSS software.

Results

Table 1. shows that the median age was for cases and controls, and the odds of cesarean were significantly higher for mothers >30 (OR 1.7-p = 0.02) than the younger group. 60% of participants had a university degree, where the schooling did not significant effect on the type of delivery.

Table (1): Demographic factors of participants and type of delivery.

	Type of Delivery				**OR***	**P****
	Vaginal		**Cesarean**			
	n	**%**	**n**	**%**		
Age						0.02
16 to 29	80	53.7	58	40.3		
30 to 45	69	46.3	86	59.7	1.7	
Total	149	100	144	100		
Schooling						0.90
Primary	16	10.7	15	10.4	1.0	
Secondary	37	24.8	35	24.3	1.0	
University	96	64.5	94	65.3		
Total	149	100.0	144	100.0		

*OR= cesarean section/vaginal delivery

**P = probability value (chi square)

Table 2 shows that there was a strong association between obstetric history and type of delivery, multipara whose last delivery was cesarean where more significant risk for cesarean section (OR 19-p = 0.00) than last vaginal delivery.

Table (2): Obstetric history of participants and type of delivery.

	Type of Delivery				OR*	P**
	Vaginal		Cesarean			
	n	%	n	%		
Obstetric history						0.00
Last delivery cesarean	7	4.7	94	65.3	19	
Last delivery vaginal	115	77.8	31	21.5	0.3	
Primipara	27	18.1	19	13.2		
Total	149	100	144	100		

*OR= cesarean section/vaginal delivery
**P = probability value (chi square)

The prenatal number of visits, trimester of initiation, and prenatal care at the same hospital had no significant association with cesarean delivery. Whereas mothers with expressed adverse gestational events, hypertension, loss of amniotic fluid, and fetal distress appeared with no significant odd on cesarean delivery (Table 3,4)

Table (3): Prenatal care factors of participants and type of delivery.

	Type of Delivery				OR*	P**
	Vaginal		Cesarean			
	N	%	n	%		
Number of visits						0.50
0 to 6	31	20.8	34	23.6	1.17	
>6	118	79.2	110	76.4		
Total	149	100	144	100		
Trimester of initiation						0.40
1st	130	87.2	130	90.3	1.35	
2nd to 3rd	14	12.8	19	9.7		
Total	144	100	149	100		
Prenatal & delivery at same hospital						0.50
Yes	44	29.5	47	32.6	1.15	
No	105	70.5	97	67.4		
Total	149	100	144	100		

*OR= cesarean section/vaginal delivery
**P = probability value (chi square)

Table (4): Adverse gestational events and type of delivery.

	Type of Delivery				OR*	P**
	Vaginal		Cesarean			
	N	%	n	%		
Hypertension						0.60
Yes	3	2	4	2.8	1.3	
No	146	98	140	97.2		
Total	149	100	144	100		
3rd trimester bleeding						0.10
Yes	5	3.4	10	6.9		
No	144	96.6	134	93.1	2.14	
Total	149	100	144	100		

Loss f amniotic fluid						0.70
Yes	22	14.8	23	16		
No	127	85.2	121	84	1.0	
Total	149	100	144	100		
fetal distress						0.08
Yes	19	12.8	29	20.1	1.7	
No	130	87.2	115	79.9		
Total	149	100	144	100		

*OR= cesarean section/vaginal delivery
**P = probability value (chi square)

Mothers' requests for cesarean and doctors' requests were of strong significant odd of cesarean delivery, mothers leaving home with signs of labor was significant odd of cesarean delivery (OR 17- p = 0.00) (Table 5).

Table (5): Patient and doctor decisions and type of delivery.

	Type of Delivery				**OR***	**P****
	Vaginal		**Cesarean**			
	N	**%**	**N**	**%**		
Dr. request						0.00
Yes	4	2.7	123	85.4	212	
No	145	97.3	21	14.6		
Total	149	100	144	100		
Pt. request						0.00
Yes	4	4.7	123	83.8	3.9	
No	145	95.3	21	16.2		
Total	149	100	144	100		

*OR= cesarean section/vaginal delivery
**P = probability value (chi square)

Characteristics of admission, mothers admitted in the morning had significant odd of cesarean delivery, cervical dilation <4 (OR 8- p =0.00), and intact membrane at admission (OR 2.2 – P = 0.00) was significantly odd for cesarean section, fetal gestational age appear no association with type of delivery, where fetal presentation other than cephalic were significant odd for cesarean delivery (OR 12 – p = 0.00), in management of labor, mothers haven't amniotomy more risk for cesarean than how had amniotomy (OR 4.8 – p =0.00), drug induction were not significant odd to cesarean delivery as time of delivery (Table 6,7).

Table (6): Characteristic of admission of participants and type of delivery.

	Type of Delivery				**OR***	**P***
	Vaginal		**Cesarean**			
	N	**%**	**n**	**%**		
Labor signs at home						0.00
Yes	138	92.6	60	42.4		
No	11	7.4	83	57.6	17.3	
Total	149	100	144	100		
Time at admission						0.00
8:00 to 18:00	79	53	120	83.9	4.6	
19:00 to 7:00	70	47	23	16.1		

Total	149	100	143	100		
Gestational age						0.20
<37	1	0.7	4	2.8	0.2	
37 – 40	122	81.9	122	84.7		
40-43	26	17.4	18	12.5	1.4	
Total	148	100	144	100		
Fetal presentation						0.00
Cephalic	147	98.7	123	85.4		
Others	2	1.3	21	14.6	12	
Total	149	100	144	100		

*OR= cesarean section/vaginal delivery
*P = probability value (chi square)

Table (7): Labor management factors and type of delivery.

	Type of Delivery				OR*	P**
	Vaginal		Cesarean			
	N	%	n	%		
Amniotomy						0.00
Yes	53	35.6	15	10.4		
No	96	64.4	129	89.6	4.7	
Total	149	100	144	100		
Drugs induce labor						0.06
Yes	20	13.4	10	6.9	2.0	
No	129	86.6	134	93.1		
Total	149	100	144	100		
Time of delivery						0.09
8:00 to 18:00	103	69.1	86	59.7		
19:00 to 7:00	46	30.9	58	40.3	0.6	
Total	149	100	144	100		
Status of membrane						0.00
Intact	101	67.8	119	82.6	2.2	
Rupture	48	32.2	25	17.4		
Total	149	100	144	100		

*OR= cesarean section/vaginal delivery
**P = probability value (chi square)

Discussion

in this study, we examined various factors that may contribute to the high rates of cesarean sections. These factors included sociodemographic, prenatal care, parity, adverse gestational events, characteristics of admission, labor management, and the duration of labor. The most significant factors influencing the type of delivery were previous cesarean delivery, patient-requested cesarean sections, and doctor-planned cesareans. Additionally, factors such as being over 30 years old, presenting labor signs at home, the time of admission (between 8:00 AM and 6:00 PM), cervical dilation greater than 4 cm, non-ruptured membranes, non-cephalic fetal presentations, and the absence of amniotomy were all associated with an increased risk of cesarean delivery.

There are some limitations in our study. We did not include patients from private clinics, who may have distinct characteristics. Our findings indicate that mothers over 30 years old are more likely to undergo cesarean sections compared to younger mothers, making age a significant independent factor. Other studies have reported a higher risk of cesarean delivery among younger mothers. The level of maternal education did not appear to affect the type of delivery in our study, while Manyeh et al. found a significant

risk associated with primary and high school education [9]. Obstetric history significantly influences the type of delivery. Mothers with a previous cesarean delivery were at a higher risk for repeat cesarean sections than those with a history of vaginal delivery or first-time mothers, which reflects the findings of Ibrahim Al Busaidi in Oman [13].

We also analyzed the impact of prenatal visit numbers, the trimester in which prenatal care began, and delivery at the same hospital; none of these factors significantly affected the type of delivery. In contrast, a study by Carine Milcent suggested that increased prenatal visits and education can reduce the likelihood of needing a cesarean section [10]. We believe that a larger sample size might yield significant results. The study considered the effects of adverse gestational events, which encompass various medical indications for cesarean sections. Our findings showed no significant association between conditions such as hypertension, third-trimester bleeding, loss of amniotic fluid, or fetal distress, as the majority of cases did not report these issues during pregnancy.

Regarding patients' decisions about the type of delivery, we found a higher risk of cesarean sections among mothers who preferred cesareans over vaginal delivery. This preference may stem from psychological factors or previous experiences, highlighting the need for increased prenatal education.

The doctors' decisions regarding the type of delivery were the strongest factors influencing the delivery method. Mothers were often planned for cesarean sections during prenatal care. We also examined the characteristics of admissions and found that mothers who arrived at the hospital showing any signs of labor were more likely to have a vaginal delivery. In contrast, other mothers who had scheduled cesarean sections were less likely to have gone into labor.

Additionally, mothers admitted during the day were associated with a higher rate of cesarean deliveries compared to those admitted at night, which may be related to hospital policies. There was no significant difference found in delivery type when comparing gestational age, whether term or preterm. This contrasts with the findings of Muhammad Fawad [3], which indicated that mothers admitted at preterm gestational ages were more susceptible to cesarean deliveries. We believe this may be related to fears regarding complications from vaginal deliveries for preterm infants.

Additionally, fetal presentation played a significant role, as cephalic presentation was more closely associated with cesarean deliveries. This may be to mitigate potential complications associated with other fetal presentations for both mother and child, a risk also identified in a study by Ping Guan [14].

In terms of labor management upon admission, women who underwent amniotomy were less likely to require cesarean deliveries. However, some women were already planned for cesarean sections before admission, so there were no attempts to induce normal labor. Furthermore, the use of drugs for induction showed a greater effectiveness in promoting vaginal births over cesarean deliveries for similar reasons. The timing of delivery was not related to the delivery type, as no significant correlation was found. Conversely, the status of membranes at admission had a significant effect on delivery outcomes; intact membranes were associated with a higher risk of cesarean delivery compared to ruptured membranes.

Conclusion

The study findings indicate that the high rates of cesarean sections are significantly associated with the decisions made by doctors (OR=212, $p<0.05$) and mothers (OR=3.9,$p<0.05$), adding to that patient age more than 30 years (OR=1.7,$p<0.05$), last delivery by caesarean section (OR=19,$p<0.05$), daytime admission (OR=4.6,$p<0.05$), non-cephalic fetal presentation(OR=12,$p<0.05$) and intact membrane (OR=2.2,$p<0.05$). Other factors such as mother education, prenatal care factors, adverse gestational events, gestational age, drug induced labor and time of delivery showed non-significant association with the type of delivery. Further detailed research studying these factors is highly recommended.

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