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CORRELATION BETWEEN PREVIOUS CESAREAN SECTION HISTORY AND PREECLAMPSIA OR ECLAMPSIA STATUS AND MODE OF DELIVERY AT SURABAYA, INDONESIA

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ABSTRACT

In the last decade, c-sections have become a trend among pregnant women. Several studies have discussed indications for c-sections, including some risk factors that might affect the skyrocketing number of c-sections around the world. This study aimed to determine the correlation between previous c-section history and preeclampsia or eclampsia status with the mode of delivery at Dr. Ramelan Central Naval Hospital, Surabaya. A total of 272 medical records of pregnant women from January 2019 to October 2021 were collected. Women without previous history of c-sections had 0.051 (95% CI 0.021-0.120) lower risk of having a c-section in the current delivery, and women without preeclampsia or eclampsia status had 0.200 (95% CI 0.116-0.345) lower risk of having c-section in the current delivery.

1. Introduction

Labor is a physiological process to deliver the fetus at term or near term, which is affected by several maternal and fetal factors [1]. Labor can be proceeded normally through the birth canal (vagina) or with assistance, like a c-section. Incisions are made in the abdominal area during c-section in order to take out the fetus from the uterus and are usually recommended in cases with maternal or fetal medical indications [1,2].

World Health Organization (WHO) has stated that vaginal delivery is a priority mode of delivery for pregnant women without medical indications. However, the c-section has increased drastically in the last two decades. Prior studies that collected data from 1990 to 2014 in 121 countries revealed an increase in c-sections from 6.7% to 19.1% of total deliveries, which exceeded 15%, the WHO recommended threshold value. The soaring preference had occurred for women with or without medical indications in most geographic areas, including Indonesia. A survey conducted by the Indonesian National Population and Family Planning Board (BKKBN) in 2013 and 2018 showed an increase in c-sections from 9.8% to 17.6% of total deliveries in Indonesia [3,4].

Even though the absolute indications for c-section delivery are not clear, the increase of c-section deliveries will increase the number of deliveries by mothers with prior c-sections [5]. Prior studies stated that some maternal conditions might be associated with the increased probability of c-sections, such as previous c-sections, preeclampsia or eclampsia, malpresentation, macrosomia, cephalopelvic disproportion, antepartum hemorrhage, and many others[6–9].

To this day, only a few studies conducted have reported the correlation between previous c-sections and preeclampsia or eclampsia status with the mode of delivery. This motivated us to collect and analyze data related to the risk of c-section delivery particularly previous c-sections and preeclampsia or eclampsia status and their mode of delivery.

2. Material and methods

Population and study design

This cross-sectional study used data from the electronic medical records of pregnant women who gave birth at Dr. Ramelan Central Naval Hospital in the period of January 2019 to October 2021. Dr. Ramelan Central

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Naval Hospital is a third-level referral and teaching hospital located in Surabaya, Indonesia. A total population sampling was used in this study, yielding a total of 272 study participants. The study protocol was approved by the Research Ethics Committee at Dr. Ramelan Central Naval Hospital number 66/EC/KEP/2021.

Variables

The inclusion criteria for the study participants were pregnant women who gave birth at Dr. Ramelan Central Naval Hospital within the time period of January 2019 to October 2021 and had complete medical records (identity, age, mode of delivery, previous c-section history, preeclampsia or eclampsia status). Patients with incomplete medical records were excluded from the study. Age was categorized into two groups: 16-34 years and 35 years or more. The mode of delivery was categorized into vaginal and c-section. C-section history was grouped into yes and no. Preeclampsia or eclampsia status was also grouped into yes and no.

Data processing and analysis

The collected data were analyzed using a contingency coefficient test with $\alpha = 0.05$ and a 95% Confidence Interval (CI). A p-value of less than 0.05 was interpreted as statistically significant. All statistical analyses were performed using SPSS version 26.0.

3. Results

Study participants characteristics

There were 272 medical records of pregnant women with a total of 278 neonates born at Dr. Ramelan Central Naval Hospital within the time period of January 2019 to October 2021. The characteristics of pregnant women were shown in Table 1. There were 206 (75.7%) pregnant women aged 16-34 years, and 66 (24.3%) pregnant women aged 35 years. Of all modes of deliveries, 65.4% (n=178) were delivered vaginally and the rest 34.6% (n=94) were delivered by c-section. There were 49 (18.0%) pregnant women with previous c-section history and 126 (46.3%) pregnant women with preeclampsia or eclampsia status (Table 1).

Characteristics	Frequency	Percentage (%)
Age category		
16-34 years	206	75.7
≥35 years	66	24.3
Mode of delivery		
Vaginal delivery	178	65.4
C-section	94	34.6
Previous c-section history		
Yes	49	18.0
No	223	82.0
Preeclampsia-eclampsia status		
Yes	126	46.3
No	146	53.7
Total	272	100.0

Table 1. Characteristics of study participants

Bivariate analysis

A cross-tabulation analysis (Table 2) showed that seven pregnant women (14.3%) with previous c-section history had a vaginal delivery and 42 women (85.7%) with previous c-section history had a c-section at current delivery. As seen in Table 2, an approximate significance of <0.001 was obtained from the contingency coefficient test, meaning that previous c-section history had a significant correlation with the mode of delivery. The correlation showed moderate strength of 0.450. The risk estimate was 0.051 (95% CI 0.021-0.120), meaning that women without previous history of c-sections had 0.051 times lower risk of having a c-section in the current delivery.

Another cross-tabulation analysis (Table 3) showed 59 pregnant women (46.8%) with preeclampsia or eclampsia during gestation had a vaginal delivery and 67 pregnant women (53.2%) with preeclampsia or eclampsia during gestation had a c-section delivery. As seen in Table 3, an approximate significance of <0.001 was obtained, meaning that preeclampsia or eclampsia status had a significant correlation with the mode of delivery. The correlation showed a weak strength of 0.342. The risk estimate was 0.200 (95% CI 0.116-0.345), meaning that women without preeclampsia or eclampsia status had a 0.200 times lower risk of having c-sections in the current delivery.

Previous c-section history*	Current delivery		Freq	p-value
	Vaginal n (%)	C-section n (%)		
Yes	7 (14.3)	42 (85.7)	49	<0.001
No	171 (76.7)	52 (23.3)	223	
Total	178 (65.4)	94 (34.6)	272	

**Risk estimate = 0.051 (95% CI 0.021-0.120)*

Table 2. Cross-tabulation between previous c-section history and mode of delivery

Preeclampsia or eclampsia status*	Current delivery		Freq	p-value
	Vaginal n (%)	C-section n (%)		
Yes	59 (46.8)	67 (53.2)	126	<0.001
No	119 (81.5)	27 (18.5)	146	
Total	178 (65.4)	94 (34.6)	272	

**Risk estimate = 0.200 (95% CI 0.116-0.345)*

Table 3. Cross-tabulation between preeclampsia or eclampsia status and mode of delivery

4. Discussion

This study showed a significant correlation between previous c-section history and mode of delivery (p <0.001, Table 2). Prior studies found that a previous c-section history was a significant predictor for a c-section in current delivery [10]. A previous cesarean scar was rigid and would not stretch. During labor, the descent of the fetus might lead to uterine dehiscence, contributing to a higher risk of uterine rupture, abnormal placental location, and nidation of the embryo in the area of the scar tissue (cesarean scar pregnancy) [11]. Assessing the likelihood and weighing the risk of having a vaginal birth after cesarean delivery (VBAC) should be made at individual level [12]. A trial of labor after cesarean (TOLAC) is considered a safe procedure for pregnant women before 39 weeks of gestation with one previous history of a c-section who meet the criteria [13,14].

The success rate of TOLAC reached 91.3% with a low uterine rupture rate of 0.6%, and there was no significant difference in Apgar score at 5 minutes < 7 compared to those who chose to have elective cesarean labor [13]. However, compared to spontaneous labor, induction of labor increased the risk of uterine rupture in women following TOLAC [15,16].

The prevalence of placenta previa and accrete also increased in women with a previous c-section history, which should be considered before choosing VBAC. Other risks, such as the risk of uterine rupture and excessive blood loss, should also be considered [17] VBAC could be done after the success of TOLAC. Its success was influenced by several factors, such as previous vaginal delivery, a favorable cervix as a birth canal, and a satisfactory Bishop score. However, having a history of uterine rupture, obesity, preeclampsia, post-term pregnancy, breech position, maternal age > 40 years, and prelabor rupture of membranes (PROM) might lower the success of TOLAC [13,18,19].

In addition, a significant correlation was found between preeclampsia or eclampsia status and mode of delivery ($p < 0.001$, Table 3). A prior study reported that preeclampsia or eclampsia status contributed as one of the commonest causes of c-section delivery [10], even though the condition was not an absolute indication for c-section delivery and was similar to findings from other studies [8,20] Women with preeclampsia or eclampsia in current gestation had a higher risk of uterine rupture during labor. However, other factors, such as previous c-sections, previous uterine rupture, and antepartum bleeding also contributed to the determination of c-section delivery in current pregnancy for these patients [8] Furthermore, severe preeclampsia or eclampsia required immediate measures and termination of pregnancy, while vaginal delivery required extra time and monitoring especially when there was a lack of anti-hypertensive therapy. Hence there would be no time to wait for vaginal delivery [21,22]

Approximately 46.8% of all pregnant women with preeclampsia or eclampsia were able to deliver vaginally. A previous study found that induced labor might facilitate vaginal delivery in nulliparous and parous women with preeclampsia. In these cases, extra evaluation for both maternal and fetal conditions was needed. Assistance, such as induction, could help the delivery process. However, when there were other factors complicating the current pregnancy, c-section delivery could be the preferable choice [23–25].

Moreover, Indonesia's referral system is still not effectively organized, which prevent pregnant women from getting prompt medical measure. There are three classical 'late' conditions in Indonesia that may contribute to maternal morbidity and mortality: late decision-making, late arriving at the referral hospital, and late getting treatment. Further, there are also four 'too' conditions that may increase the risk of maternal morbidity and mortality in Indonesia: too young pregnant women, too old pregnant women, the too close birth interval between children, and having too many children. Pregnant women with a history of c-sections and preeclampsia or eclampsia should be closely monitored and get prompt treatment, especially if they want to deliver vaginally [26].

The present studies compiled 272 study participants with different backgrounds and maternal or fetal histories that might affect the results of this study. The fact that the research only used study participants from one third-level hospital, is a limitation of this study. A deeper understanding of the trends may be achieved by analyzing more study participants in several different hospitals with more attention to other maternal or fetal factors that may accompany and affect the mode of delivery.

5. Conclusions

Previous c-section history and preeclampsia or eclampsia status were found to be correlated to the mode of delivery at dr. Ramelan Central Naval Hospital Surabaya. There was a statistically significant correlation between previous c-section history and preeclampsia-eclampsia status and the mode of delivery. Further research including more variables and study participants in several other hospitals is suggested.

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