THE CORRELATION OF PREECLAMPSIA, AGE, AND TYPE OF DELIVERY IN POSTPARTUM HEMORRHAGE

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Abstract

The number of maternal deaths in Semarang City in 2021 was 21 cases out of 22,030 live births, or around 95.32 deaths per 100,000 live births, with the causes of death dominated by bleeding (14.29%) and hypertension (9.52%). Postpartum hemorrhage is caused by four main factors known as the 4T: tone, trauma, tissue, and thrombin. This study was conducted to determine the relationship between preeclampsia, maternal age, and type of delivery with the incidence of postpartum hemorrhage at Central General Hospital Dr. Kariadi Semarang in 2020–2022. The study was an analytic observational quantitative research with a retrospective case control study. The study was conducted in February 2023 with a total sample of 100 samples divided into case (total sampling) and control (simple random sampling) groups with a ratio of 1: 1 for each group. Statistical tests used Chi-square and odds ratio (OR) tests. The results showed that there was no relationship between preeclampsia and the incidence of postpartum hemorrhage (p-value = 0.063; OR = 0.347), there was a relationship between maternal age and the incidence of postpartum hemorrhage (p-value = 0.011; OR = 3.455), and there was a relationship between the type of delivery and postpartum hemorrhage (p-value = 0.012; OR = 2.923). The community can be expected to play an active role in integrated service post cadre activities and ante natal care assistance. Health workers and educational institutions also need to improve their knowledge and skills to form qualified health workers through certified training.

Keywords: Postpartum hemorrhage; Preeclampsia; Mother's age; Type of delivery

1. Introduction

The Maternal Mortality Rate (MMR) is an indicator to assess the degree of maternal welfare and the success of maternal health program. The World Health Organization (WHO) stated that around 295,000 women died during pregnancy and childbirth in 2017. The MMR between 2020 and 2017 fell by around 38% worldwide (WHO, 2020).

At an international conference, the International Conference on Indonesia Family Planning and Reproductive Health (ICIFPRH), it was stated that the MMR in Indonesia in 2019 was still high, namely 305/100,000 live births. The MMR is still far from the target of 232 in 2024 (The Central Agency Statistics Of Indonesia , 2015).

Central Java Province reported a decrease in maternal mortality during the 2016–2019 period. An increase in maternal mortality occurred in 2020, from 76.9 to 98.6 per 100,000 live births (Central Java Health Office, 2020). The highest distribution of maternal deaths in Central Java Province occurred during the postpartum period (61.3%). Meanwhile, in Semarang City in 2021, the number of maternal deaths will be 21 cases out of 22,030 live births, or around 95.32 per 100,000 live births (Health Office of Semarang, 2021).

At the National Health Working Meeting (Rakernas) held in 2019 by the Indonesian

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Ministry of Health, it was stated that there were three types of the highest causes of maternal death in Indonesia: hypertensive disorders (33.07%), obstetric hemorrhage (27.03%), and non-obstetric complications. (15.7%). The highest causes of maternal death in Central Java Province in 2020 include hypertension in pregnancy (25.5%) and hemorrhage (17.5%) (Central Java Health Office, 2020). Causes of maternal death in Semarang City in 2021 are dominated by hemorrhage (14.29%) and hypertension (9.52%) (Health Office of Semarang, 2021).

Postpartum hemorrhage, or PPH, is bleeding that often occurs as a complication of the puerperium. Postpartum hemorrhage is divided into two categories, namely primary and secondary postpartum hemorrhage. Primary postpartum hemorrhage is bleeding that occurs in the first 24 hours postpartum, while secondary bleeding occurs after 24 hours postpartum (Persatuan Obstetri Ginekologi Indonesia, 2016). Limit the amount of blood that comes out so that it can be said to be bleeding if the amount of blood that comes out is >500 ml with vaginal delivery and >1000 ml with abdominal surgery or a cesarean section. In practice, the amount of bleeding is rarely measured objectively.

Postpartum hemorrhage is caused by four main factors known as the 4T, namely tone, trauma, tissue, and thrombin. The tone factor is the most common causal factor in postpartum hemorrhage cases. Tone factors include maternal age >35 years, prolonged labor, preeclampsia, and the use of oxytocin (Persatuan Obstetri Ginekologi Indonesia, 2016).

The second most common causative factor is traumatic factors such as expansion of the cesarean section wound and assisted vaginal delivery (Nurkhalizah et al., 2021). Several risk factors for postpartum hemorrhage are maternal age >35 years (OR 3.0) and preeclampsia (OR 2.2–5.0) (Persatuan Obsteri Ginekologi Indonesia, 2016).

Mothers who had a history of complications during the postpartum period, among others, with the characteristics of the age of the mother (10–19 years) of 15.24%, the age of the mother 35–39 years (11.26%), the age 40–44 years (13.65%), and the age 45–49 years (8.26%) (Riskesdas, 2018). Pregnant women aged less than 20 years or more than 35 years have a 3.7 times greater risk of experiencing postpartum hemorrhage (Ummah, N., Ngadiyono, N., & Ulfiana, E. 2018) Other research states that mothers in the risky age category have 2.5 times the risk of postpartum hemorrhage (Wahyuni, S., & Surani, E. 2019)

Another risk factor for postpartum hemorrhage, which is an indirect cause, is the type of delivery (Nurkhalizah et al., 2021). There are three types of deliveries: spontaneous deliveries, artificial deliveries, and recommended deliveries. Spontaneous birth takes place under the mother's own power through the birth canal. Artificial birth is a birth assisted by a health worker to expel the baby, while recommended delivery occurs after the rupture of the amniotic sac and the administration of pitocin or prostaglandins (Kurniarum., A. 2016).

Another category of types of delivery is operative and inoperative delivery. Delivery with action, namely delivery using device intervention, for example, action in artificial childbirth, and temporary recommendations for delivery without action, namely delivery without tool intervention, for example, spontaneous delivery (Ximenes et al., 2020).

Preliminary study data at Central General Hospital Dr. Kariadi Semarang obtained, namely, the number of Moderate Preeclampsia in 2020-2022 was 5 people, Severe preeclampsia in 2020-2022 was 261 people, PE unspecified in 2020-2022 was 69 people. The number of third stage hemorrhage is 36 people, delayed and secondary postpartum hemorrhage is 12 people. This figure indicates that the incidence of postpartum hemorrhage is still an emergency in obstetrics that occurs every year.

Based on this background, the researchers were interested in examining the correlation between preeclampsia, maternal age, and type of delivery with the incidence of postpartum hemorrhage in an effort to prevent, screening, and add insight to those involved.

2. Method

This research was quantitative observational analytic study with a case-control study research design and a retrospective approach that uses secondary data in the form of medical record data. The case-control research design is a study that uses two groups, namely the case group and the control group, for comparative case studies.

The research was conducted from September 2022 to February 2023 at the Central General Hospital Dr. Kariadi, Semarang, Central Java. The total number of samples is 100, with a ratio of cases to controls of 1:1. The case group was women giving birth in 2020–2022, who experienced postpartum hemorrhage, with a total sampling. The control group was women giving birth in 2020–2022, who did not experience postpartum hemorrhage using simple random sampling using a lottery with the help of a spin wheel generator.

The inclusion criteria in this study were complete and easy-to-read medical record data, including medical record number, mother's identity, obstetric and maternal disease diagnoses, results of maternal blood pressure measurements, and type of delivery. Exclusion criteria in this study were medical record data from patients who had a diagnosis of superimposed preeclampsia and HELLP syndrome.

The analysis used univariate and bivariate tests, namely the chi-square test and odds ratio. Ethical clearance in this study was validated with a proper ethical statement by the Health Research Ethics Committee of the Health Research Polytechnic of the Ministry of Health Semarang with number No. 0778/EA/KEPK/2022.

3. Result and Discussion

Univariate Analysis

Table 1. Frequency Distribution of Postpartum Hemorrhage

Postpartum Hemorrhagic Events	Frequency (N)	Percentage (%)
Postpartum Hemorrhage (Case)	50	100
No Postpartum Hemorrahage (Control)	50	100
Total	100	100

Source: Secondary Data, 2020-2022

Table 1 shows that the case and control groups each have 50 respondents. The total sample for this research is 100 respondents.

Table 2. Frequency Distribution of Preeclampsia with Postpartum Hemorrhage

Preeclampsia	Postpartum Hemorrhagic			
	Case		Control	
	N	%	N	%
Not have	40	80	42	84
Have Preeclampsia	10	20	8	16
Total	50	100	50	100

Source: Secondary Data, 2020-2022.

Table 2 states that the majority of mothers do not experience preeclampsia, namely 42 (84%) of the control group respondents and 40 (80%) of the case group respondents.

Table 2 indicates that the majority of mothers in both groups not have preeclampsia. Specifically, 42 (84%) of control group respondents and 40 (80%) of the case group respondents.

Table 3. Frequency Distribution of Mother's Age with Postpartum Hemorrhage

Age	Postpartum Hemorrhagic			
	Case		Control	
	N	%	N	%
No Risk (20-35 years)	32	64	43	86
Risky (<20 or >35 years)	18	36	7	14
Total	50	100	50	100

Source: Secondary Data, 2020-2022.

Table 3 states that the majority of mothers are not at risk, namely 43 (86%) of the control group respondents and 32 (64%) of the case group respondents.

Table 3 indicates that the majority of mothers in both groups not at risk. Specifically, 43 (86%) of the respondents in the control group and 32 (64%) of the respondents in the case group.

Table 4. Frequency Distribution of Types of Delivery with Postpartum Hemorrhage

Types of Delivery	Postpartum Hemorrhagic			
	Case		Control	
	N	%	N	%
No Action	26	52	38	76
With Action	24	48	12	24
Total	50	100	50	100

Source: Secondary Data, 2020-2022

Table 4 states that the majority of mothers gave birth without action, namely 38 (76%) of the control group respondents and 26 (52%) of the case group respondents.

Table 4 indicates that the majority of mothers in both groups gave birth without medical intervention. Specifically, 38 (76%) of the respondents in the control group and 26 (32%) of the respondents in the case group had unassisted births.

Bivariate Analysis

Table 5. The Correlation Between Preeclampsia and Postpartum Hemorrhage

Preeclampsia	Postpartum Hemorrhage				X²(p)	OR (CI95%)	Lower Bound	Upper Bound
	Case		Control					
	N	%	N	%				
Not Have Preeclampsia	40	80	42	84	0,603	1,313	0,471	3,660
Have Preeclampsia	10	20	8	16				
Total	50	100	50	100				

Equation: Chi-square Test

Table 6. The CorrelationnBetween Mother's Age and Postpartum Hemorrhage

Age	Postpartum Hemorrhage				X² (p)	OR (CI95%)	Lower Bound	Upper Bound
	Case		Control					
	N	%	N	%				
No Risk	32	64	43	86	0,011	3,455	1,289	9,259
Risky	18	18	7	14				
Total	50	100	50	100				

Equation: Chi-square Test

Table 7. The Correlation Between The Types of Delivery and Postpartum Hemorrhage

Types of Delivery	Postpartum Hemorrhage				X²(p)	OR (CI95%)	Lower Bound	Upper Bound
	Case		Control					
	N	%	N	%				
No Action	26	52	38	76	0,012	2,923	1,245	6,865
Action	24	48	12	24				
Total	50	100	50	100				

Equation: Chi-square Test

1. Preeclampsia

Table 5 shows that the Chi-square test value is 0.603 (X² = 0.603; CI = 95%) and the odds ratio value is 1.313 (OR = 1.313; 0.471-3.660). The interpretation of the results of the Chi-square test in this study shows that the p-value (sig) > 0.05 means that H0 is accepted and Ha is rejected and that the OR value is 1.313, so OR> 1. That is, there is no relationship between preeclampsia and the incidence of postpartum hemorrhage, but preeclampsia is a risk factor for postpartum hemorrhage in Provincial General Hospital Dr. Kariadi Semarang in 2020–2022. A delivery mother who suffers from preeclampsia has a 1.3-times greater risk of experiencing postpartum hemorrhage during her puerperium. Based on the Lower Bound and Upper Bound Odds Ratio values, at least mothers with preeclampsia are at least 3.7 times at risk of experiencing postpartum hemorrhage.

The research results are different from previous research, it was explained that there was a relationship between preeclampsia and postpartum hemorrhage (Maros, H., & Juniar, S. 2019). Mothers with preeclampsia who experience postpartum hemorrhage experience a decrease in plasma volume, which will then result in hemoconcentration and an increased hematocrit.

Other research was explained that there was no relationship between preeclampsia and postpartum hemorrhage (Herawati, I., Effendi, F. 2017). There is no correlation between preeclampsia and postpartum hemorrhage because preeclampsia is an indirect cause, so postpartum hemorrhage is caused by other factors that are different from the causes of preeclampsia. The exact cause of preeclampsia has not been ascertained until now.

Preeclampsia is included as one of the four main factors causing postpartum hemorrhage. The tone factor refers to the ability of uterine contractions to cover the ruptured blood vessels after the placenta is released from the uterine wall during labor (Escobar et al., 2014). Postpartum bleeding can occur due to several factors, such as vascular abnormalities, infection, a placenta that is not separated properly, and premature labor (Nuriza et al., 2020).

Preeclampsia is thought to be caused by problems with the placenta, which cause high blood pressure and damage to organs in pregnant women, such as the kidneys (Rana et al., 2019). Usually, during pregnancy, the spiral arteries dilate and develop into the large uteroplacental arteries that are capable of supplying blood to the fetus. Poor placental perfusion causes intrauterine growth restriction and can enter the maternal circulation. This can cause the endothelial cells lining the blood vessels to malfunction, which then results in hypertension and kidney damage (Cunningham et al., 2012).

Although preeclampsia is not always associated with postpartum hemorrhage, preeclampsia is a risk factor for postpartum hemorrhage. Preeclampsia can affect the outcomes of both maternal and neonatal patients (Natalia et al., 2022).

2. Mother's Age

Table 6 shows that there is a significant relationship between maternal age and the incidence of postpartum hemorrhage, and maternal age is a risk factor for postpartum hemorrhage with a Chi-square test p-value of 0.011 and an OR of 3.455 (X^2= 0.011; OR = 3.455; CI = 95%). That is, a woman giving birth at a risky age (20 years or> 35 years) has a 3.5 times greater risk of experiencing postpartum hemorrhage during her puerperium. Based on the value of the Lower Bound and Upper Bound Odds Ratio, at least the risk of giving birth to mothers with at least 1.2 times the risk and the greatest risk of 9.2 times experiencing postpartum hemorrhage.

Mothers aged 20 years or >35 years experience postpartum hemorrhage, so it has a 3.7-fold risk (Ummah, N., Ngadiyono, N & Ulfiana, E. 2018). The reproductive organs under the age of 20 are unhealthy, so complications often arise during childbirth. Reproductive organs in women aged > 35 years will experience a decline in function, such as uterine overdistention. Uterine overdistention is a condition where the uterus is too stretched so that it cannot contract properly immediately after the placenta is born (Nurchairina, 2017). Failure of the uterus to contract adequately after delivery is the most common cause of obstetric hemorrhage (Cunningham et al., 2012).

There is a correlation between age and the incidence of postpartum hemorrhage due to uterine atony (Maros, H., & Juniar, S. 2019). Maternal age and uterine atony are related to the process of uterine involution (Astriana, W. 2019). Uterine involution is the process of shrinking the size of the uterus after delivery.

Female reproductive organs, such as the uterus, will function optimally in women of childbearing age. Along with increasing age or if the amount of ovarian hormone availability decreases, the structure of the reproductive organs will shrink and not function properly (Waluyo et al., 2022). Older mothers tend to experience high-risk pregnancies such as hypertension and gestational diabetes, which increase the risk of postpartum hemorrhage and can trigger postpartum hemorrhage (Harun, A. 2018).

3. Type of Delivery

Table 7 shows that there is a significant relationship between the type of delivery and postpartum hemorrhage, with the results of the Chi-square test p-value of 0.012 or p-value 0.05 and the odds ratio value of 2.923 (X^2 = 0.012; OR = 2.923; CI = 95%). This means that a birthing mother who delivers by means of action has a three times greater risk of experiencing postpartum hemorrhage during her puerperium. Based on the value of the lower bound and upper bound odds ratios, at least women who give birth with an operation are at least 1.2 times at risk, and the greatest risk is 6.8 times to experience postpartum hemorrhage.

Delivery by surgery, namely cesarean section, increases the risk of complications for the mother compared to vaginal delivery (Sharma, S., & Dhakal, I. 2018). Another study also explained that this type of delivery can increase the risk of postpartum hemorrhage in the mother by up to 1.4 times (Li et al., 2021). This risk can be further increased if it is accompanied by other complicating conditions such as placenta accreta, placenta previa, or macrosomia.

In normal labor, without action, the contractions will help close the blood vessels and prevent excessive bleeding. In addition, normal delivery usually does not require surgery, so the risk of bleeding due to tears (trauma factors) in the uterus or other organs is lower (Wei, Q., Xu, Y., & Zhang, L. 2020). In labor with procedures such as cesarean section delivery, uterine surgery will occur, which can cause injuries and trigger excessive bleeding.

Types of deliveries with procedures such as induction of labor have a relative risk (RR) of 1.7 times (CI = 99%). The results of the RR value (CI = 99%) in elective cesarean section compared to vaginal surgery, which is 1.7 times, compared to spontaneous

delivery, which is 1.7 times, compared to spontaneous delivery, which is 3.9 times. Meanwhile, vaginal surgery compared to spontaneous delivery was 2.4 times greater (CI = 99%). vaginal surgery compared to spontaneous delivery was 2.4 times greater (CI = 99%). is 3.9 times. Meanwhile, vaginal surgery compared to spontaneous delivery was 2.4 times greater (CI = 99%). results of the RR value (CI = 99%) in elective cesarean section compared to vaginal surgery, which is 1.7 times, compared to spontaneous delivery, which is 3.9 times. Meanwhile, vaginal surgery compared to spontaneous delivery was 2.4 times greater (CI = 99%) (Persatuan Obstetri Ginekologi Indonesia. 2016).

CONCLUSION

The conclusion of this study is that the age of the mother and the type of delivery has a relationship with the incidence of postpartum hemorrhage, while preeclampsia has no relationship with the incidence of postpartum hemorrhage.

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