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Biopsychosocial Factors Associated with Postpartum Haemorrhage in Surakarta, Central Java

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ABSTRACT

Background: Postpartum haemorrhage is the primary cause of maternal mortality worldwide. However, studies in Indonesia examining factors associated with postpartum haemorrhage are sparse. The purpose of this study was to examine factors associated with postpartum haemorrhage.

Subjects and Method: This was an analytic observational study with a case-control design. The study was conducted at Dr. Moewardi hospital, Surakarta, Central Java, from May 2017 to May 2018. A total sample of 200 postpartum mothers was selected by fixed disease sampling. The dependent variable was postpartum haemorrhage. The independent variables were age, parity, birth space, anaemia, antenatal care, obstetrics history, education, and self-efficacy. The data were collected by questionnaire and analyzed by path analysis on Stata 13.

Results: Postpartum haemorrhage was positively and directly associated with poor obstetric history ($b=0.87$; 95%CI=-0.03 to 1.79; $p=0.059$), older age ($b=1.86$; 95%CI=0.81 to 2.92; $p=0.001$), multiparity ($b=1.62$; 95%CI=0.08 to 3.15; $p=0.038$), anemia ($b=1.74$; 95%CI=0.83 to 2.66; $p<0.001$), and narrow birth space ($b=-2.51$; 95%CI=-3.56 to -1.47; $p<0.001$). Postpartum haemorrhage was indirectly associated with antenatal care, education, and self-efficacy.

Conclusion: Postpartum haemorrhage is positively associated with poor obstetric history, older age, multiparity, anemia, and narrow birth space. Postpartum haemorrhage is indirectly associated with antenatal care, education, and self-efficacy

Keywords: postpartum haemorrhage, determinant, path analysis

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BACKGROUND

Maternal mortality rate (MMR) is one of the indicators to assess the degree of public health. Based on the 2015 AKI Population Survey (SUPAS) in Indonesia, there were 305 per 100,000 live births. This figure is still quite high when compared to the target set by SDGs (Sustainable Development Goals) by 2030, meaning that AKI can reach below 70 per 100,000 births life. Based on data from the Central Java Provincial Health Office in 2016, the maternal mortality rate was 109.65 per 100,000 live births. Postpartum haemorrhage is one of

the main causes of maternal death. Bleeding often occurs due to complications during pregnancy and childbirth (MoH RI, 2016, Central Java Health Office, 2016; Ministry of Health RI, 2015).

Based on data from the Ministry of Health of the Republic of Indonesia, in 2014, the incidence of maternal bleeding in Indonesia amounted to 30.3% in 2013, while based on Central Java Provincial Health Office in 2016, bleeding incidence amounted to 33.22%. In Surakarta, in 2015, there were 5 cases of maternal deaths, which occurred in postpartum and caused

by bleeding and eclampsia (Ministry of Health, 2014; Central Java Health Office, 2016; Health Office Surakarta, 2016).

There are several factors that influence the occurrence of postpartum hemorrhage, such as too young age under the age of 20, this is because the female reproductive function is not fully perfect for pregnancy and childbirth, while at the age of too old at over 35 years, female reproductive function begin weakening that can increase the risks at the time of birth which is postpartum hemorrhage. Education and distance of pregnancy can also affect the occurrence of postpartum hemorrhage because low-educated mothers are less informed, whereas too close and far-reaching pregnancies can lead to maternal complications during delivery (Cavazos-rehg et al., 2015).

Parity and anemia can also affect the occurrence of postpartum hemorrhage because women who have high parity have decreased their reproductive function. Meanwhile women suffering from anemia during pregnancy cause uterine muscle to become weak that can cause uterine atony (Oberg et al., 2014).

Based on a study conducted by Nyfløt et al (2017), it was found that there was an influence of obstetric history on the incidence of postpartum hemorrhage, since mothers with a history of postpartum hemorrhage in previous delivery were more at risk than mothers without a history of postpartum hemorrhage. Inadequate antenatal care (ANC) visits in pregnant women may also increase the incidence of postpartum hemorrhage, because with regular ANC, it can detect premature likelihood of occurrence of disease that arises during pregnancy, so that it can be handled immediately if there are complications. Mothers who have low self-efficacy at the time of delivery indirectly may lead to complica-

tions in the case of birth delivery, due to mothers with low efficacy (Afolabi et al, 2013; Fadel et al., 2016; WHO, 2012).

The purpose of this study was to analyze the relationship of age, parity, gestational distance, anemia, antenatal care, obstetric history, education, self efficacy.

SUBJECTS AND METHOD

1. Study design

The was an analytic observational study with a case control design. The study was conducted in Surakarta.

2. Population and samples

The target population in this study was all mothers giving birth, while the source population in this study was the mothers who gave birth at Dr. Moewardi hospital and Surakarta, Central Java, in May 2017 to May 2018. A sample of 200 postpartum mothers was selected by fixed disease sampling, consisting of 50 postpartum mothers with hemorrhage and 150 postpartum mothers without hemorrhage.

3. Study variables

The dependent variable was postpartum hemorrhage. The independent variables included age, parity, gestational distance, anemia, antenatal care, obstetric history, education, self efficacy.

4. Operational definition of variables

Postpartum haemorrhage was defined as a loss of 500 ml of blood from the placental implant site, which occurs after the baby is born. Age was defined as the age of the mother at the time of delivery.

Parity was defined as the number of children born to mothers either living or dying. Antenatal care was defined as the first pregnancy check up before delivery. Obstetric history was defined as a difficult complication during pregnancy, labor, childbirth, before. Birth spacing was defined as the distance between the current

pregnancy and the previous pregnancy. Anemia was defined as a maternal condition with hemoglobin levels <11 g/dL. Education was defined as a formal education level that includes the level of elementary, junior high, high school and college that will affect health behavior. Self-efficacy was defined as the conviction/ ability of within a person to face the birth delivery.

5. Study Instruments

The data collection technique was conducted using primary data and secondary data. The primary data were obtained using questionnaires containing the characteristics of study subjects. The secondary data were obtained from medical record and maternal and child monitoring book.

6. Data Analysis

The data analysis was done using path analysis with program stata 13 to know the relation of the independent variable and the dependent variable and to know the relation on those variables.

7. Research Ethics

The research ethics included informed consent, anonymity, confidentiality and ethical clearance. The ethical clearance in this study was conducted at Dr. Moewardi hospital Surakarta and was declared as worthy of ethics based on the decision letter number: 387 / IV / HREC / 2018.

RESULTS

1. Univariate Analysis

Table 1 shows that the study subjects aged 20-35 years were 162 mothers (81%), and those aged <20, >35 years were 38 mothers (19%). Mothers who have 2-4 children were 182 mothers (91%), and who have >4 children were 18 mothers (9%). Mothers with distance of pregnant <2 years were 33 mothers (15.5%), and who have a gestational distance \geq 2 years were 167 mothers (83.5%). Mothers with hemoglobin level of 11 g/dL were 123 mothers (61.5%), and who

had hemoglobin <11 g/dL were 77 mothers (38.5%). Mothers who visited antenatal care <4 times were 28 mothers (14%), and those who had antenatal care visits > 4 times were 172 mothers (86%). Mothers with no previous obstetric history in pregnancy and labor were 125 mothers (62.5%), and women who had a previous history of obstetrics in pregnancy and delivery were 75 (37.5%). Mothers with low education were 57 mothers (28.5%), and mothers who had higher education were 143 mothers (71.5%). Subjects with low self-efficacy were 83 mothers (41.5%), and those with high self-efficacy were 83 mothers (58.5%)

Table 1. The results of univariate analysis

Variable	n	(%)
Postpartum bleeding		
No	150	75.0
Yes	50	25.0
Age		
20-35 years old	162	81.0
<20, >35 years old	38	19.0
Parity		
2-4 years	182	91.0
> 4 years	18	9.0
Pregnancy distance		
< 2 years	33	15.5
\geq 2 years	167	83.5
Anemia		
\geq 11 g/dL	123	61.5
< 11 g/dL	77	38.5
Antenatal Care		
< 4 times	28	14.0
> 4 times	172	86.0
Obstetric History		
No	125	62.5
Yes	75	37.5
Education		
Low	57	28.5
High	143	71.5
Self-Efficacy		
Low	83	41.5
High	117	58.5

2. Bivariate Analysis

Bivariate analysis was used to observe the association of independent variables (age, parity, gestational distance, anemia, antenatal care, obstetric history, education, self

efficacy) with the dependent variable (incidence of postpartum hemorrhage). The result of bivariate analysis can be seen in Table 2.

Table 2. The results of bivariate analysis

Variable	No bleeding		Bleeding		Total		OR	95% CI	p
	n=150	%	n=50	%	n=200	%			
Age								2.66 to	
20-35 years old	133	82.1	29	17.9	162	100	5.66	12.05	<0.001
<20, >35 years old	17	44.7	21	55.3	38	100			
Parity								3.41 to	<0.001
2-4 years	145	79.7	37	20.3	182	100	10.12	30.39	
> 4 years	5	27.8	13	72.2	18	100			
Birth spacing								0.44 to	<0.001
< 2 years	11	33.3	22	66.7	33	100	0.10	0.231	
≥ 2 years	139	83.2	28	16.8	167	100			
Anemia								4.281 to	<0.001
≥ 11 g/dL	111	90.2	12	9.8	123	100	9.013	18.97	
< 11 g/dL	39	50.6	38	49.4	77	100			
Antenatal Care								0.20 to	<0.001
< 4 times	6	21.4	22	78.6	28	100	0.53	55.88	
> 4 times	144	83.7	28	16.3	172	100			
Obstetric History								0.143 to	<0.001
No history	73	94.8	4	5.2	77	100	17.98	52.01	
With history	67	50.4	66	49.6	133	100			
Education								0.222 to	0.015
Low	36	63.2	21	36.8	57	100	0.44	0.857	
High	114	79.0	29	20.3	143	100			
Self-Efficacy								0.019 to	<0.001
Low	39	47.0	44	3.9	83	100	0.48	0.121	
High	111	94.9	6	80.2	117	100			

Table 2 shows the results of bivariate analysis on the determinants of postpartum bleeding. Table 2 shows that maternal age <20 or >35 years, parity >4, anemia, and poor obstetrics history increased the risk of postpartum bleeding, and it was statistically significant. Birth spacing ≥2 years, ANC >4 times, high education, and strong self efficacy decreased the risk of postpartum bleeding.

3. The Result of Path Analysis

Table 3 showed that there was a significant relationship between obstetric history, age,

parity, anemia, and birth spacing on postpartum haemorrhage.

Postpartum haemorrhage was directly and positively affected by obstetric history (b= 0.87; 95% CI= -0.03 to 1.79; p=0.059), age (b= 1.86; 95% CI= 0.81 to 2.92; p= 0.001), parity (b=1.62; 95% CI=0.08 to 3.15; p= 0.038), anemia (b= 1.74; 95% CI= 0.83 to 2.66; p<0.001), and birth spacing (b=-2.51; 95% CI= -3.56 to -1.47; p<0.001).

Postpartum haemorrhage was indirectly affected by birth spacing, education, parity, self efficacy, and antenatal care.

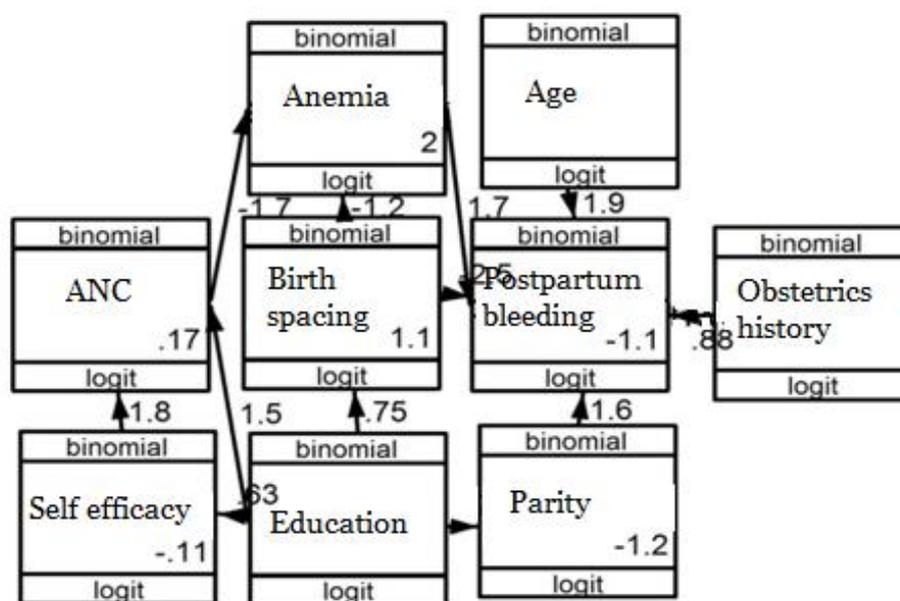


Figure 1. Path analysis model with estimation

Table 3. The Result of Path Analysis

Dependent Variable	Independent Variable	b	95%CI		p
			Lower Limit	Upper Limit	
Direct Effect					
Postpartum Haemorrhage	← Obestic history	0.87	-0.33	1.79	0.059
Postpartum Haemorrhage	← Age	1.86	0.81	2.92	0.001
Postpartum Haemorrhage	← Parity	1.62	0.08	3.15	0.038
Postpartum Haemorrhage	← Anemia	0.74	0.83	2.66	<0.001
Postpartum Haemorrhage	← Birth spacing	-2.51	-3.56	-1.47	<0.001
Indirect Effect					
Anemia	← Birth spacing	-1.21	-2.04	-0.38	0.004
Anemia	← Antenatal Care	-1.66	-2.59	-0.72	0.001
Parity	← Education	-2.09	-3.18	-1.01	<0.001
Birth spacing	← Education	0.75	0.01	1.52	0.056
Antenatal Care	← Education	1.50	0.63	2.38	0.001
Antenatal Care	← Self-efficacy	1.79	0.81	2.77	<0.001
Self-efficacy	← Education	20.63	0.14	1.25	0.045

DISCUSSIONS

1. The relationship between obstetric history and postpartum bleeding

The result of this study showed that obstetric history was associated with the incidence of postpartum haemorrhage and it was statistically significant.

The result of this study is consistent with a study by Nyfløt *et al.* (2017), which stated that there was a relationship between obstetric history and the incidence of postpartum haemorrhage. The history of com-

plications in pregnancy and labor may potentially lead to complications in subsequent pregnancies and labor. If history of past labor has complications, health personnel should be watchful to the incidence of complications in pregnancy and labor.

2. The relationship between age and postpartum haemorrhage

The result of this study showed that maternal age was associated with the incidence of postpartum haemorrhage and it was statistically significant.

The result of this study is consistent with a study by Sheldon *et al.* (2014), which stated that there was a relationship between maternal age and the incidence of postpartum haemorrhage. The characteristic of pregnant women based on the age was very influential in attention and preparation in the process of birth delivery. Healthy reproductive age that was safe to experience pregnancy and labor was at the age of 20-35 years old (Kerr *et al.*, 2016).

3. The relationship between parity and postpartum haemorrhage

The result of this study showed that the number of children was associated with postpartum haemorrhage and it was statistically significant.

The result of this study is consistent with a study by Marshall *et al.* (2017), which stated that there was a relationship between parity and the incidence of postpartum haemorrhage. Women with high parity have a greater risk of postpartum hemorrhage, because mothers who often give birth would experience a decrease in reproductive or uterine function that can lead to weak contractions during labor so that it can lead to uterine atony.

4. The relationship between anemia and postpartum haemorrhage

The result of analysis showed that there was an effect between anemia and postpartum haemorrhage and it was statistically significant.

The result of this study was in line with a study by Uygungül *et al.* (2014), which stated that there was a relationship between anemia and the incidence of postpartum haemorrhage. Mothers who have hemoglobin level of <11 in pregnancy may experience complications, due to reduced blood levels in the body, resulting in a lack of oxygen transferred to the cells of the body or brain and uterus. A decreased amount of oxygen caused the uterine

muscles to not contract adequately so that it caused uterine atony.

5. The relationship between birth spacing and postpartum haemorrhage

The result of analysis showed that there was an effect between birth spacing and postpartum haemorrhage. Birth spacing >2 years decreased the risk of postpartum hemorrhage.

The result of this study was in line with a study by Fan *et al.*, (2017) and Briley *et al.*, (2014) which stated that there was a relationship between birth spacing and the incidence of postpartum haemorrhage. The optimal birth spacing was 36 months. If the gap was too close, it can cause complications during pregnancy and labor. Short birth spacing would directly affect the maternal and infant health.

6. The relationship between ANC and postpartum haemorrhage

The result of analysis showed that there was an effect between ANC and postpartum haemorrhage through anemia. Mother with ANC >4 times decreased the risk of anemia during pregnancy.

The result of this study was in line with a study done by Obossou *et al.*, (2015), which stated that there was an indirect relationship between antenatal care and the incidence of postpartum haemorrhage. Mothers who did check up during pregnancy for >4 times would reduce the incidence of postpartum haemorrhage, because mothers who often check the pregnancy would easily detect the complications during pregnancy.

7. The relationship between education and postpartum haemorrhage

The result of analysis showed that education through parity, birth spacing, antenatal care, and self-efficacy affected the incidence of postpartum haemorrhage.

The result of this study is consistent with a study by Hanson *et al.*, (2015), which stated that there was a relationship between education and parity. This study is also consistent with a study by Al-Ateeq *et al.* (2015), which stated that there was a relationship between education and antenatal care visit. Kuo *et al.* (2014) stated that there was a relationship between education and self-efficacy. Maternal education has an indirect relationship with the incidence of postpartum haemorrhage, the higher the maternal education, the lower the incidence of postpartum haemorrhage.

8. The relationship between self-efficacy and postpartum haemorrhage

The result of analysis showed that there was a relationship between self-efficacy and the incidence of postpartum haemorrhage through antenatal care.

This was in line with a study by Briley *et al.* (2014), which stated that there was a relationship between self-efficacy and postpartum haemorrhage. Mothers who have high self-efficacy during pregnancy would have more frequent pregnancy check up, therefore, the mother knew the development of mother and baby, so that optimal health could be achieved and the mother knew about her pregnancy.

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