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RESEARCH **Open Access**

The Effect of Anemia in Pregnancy on Postpartum Hemorrhage

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Abstract
Eighty percent of maternal deaths are caused by complications during pregnancy and childbirth. Furthermore, twenty-five percent of maternal deaths is affected by postpartum hemorrhage which is estimated 100,000 deaths annually. Indonesia places at the second ranks of the highest maternal deaths country after Laos. The cause of death in Indonesia is 28% by hemorrhage. The hemorrhage in maternity is due to anemia in pregnancy. It occurs because when the mother gives birth, there will be adequate uterine contractions so that the hemorrhage is inevitable. The objective of the study is to identify the effect of anemia in pregnancy on the incidence of postpartum hemorrhage. The type of research employed is an analytic survey with a retrospective design. The research location was at Juata Tarakan Health Center. The population in this study were all pregnant women who visited the obstetrics and gynecology polyclinic in 2020 which was obtained from secondary data, the patient's medical record book at the Juata Public Health Center with a sample of 271 on June 23 to August 31, 2021. Sampling employed a non-probability sampling technique, total sampling, and the data analysis was administered univariately, and bivariate with chi-square test. The incidence of postpartum hemorrhage in women giving birth in the working area of the Juata Tarakan Health Center is 12.9%. Anemia in pregnancy possesses a significant effect on the risk of postpartum hemorrhage with p value (OR=11,253, 95%CI 5,120-24,732). Meanwhile, parity, age, type of delivery did not possess significant effect on postpartum hemorrhage. Mothers with anemia in pregnancy own a higher risk of postpartum hemorrhage which was 11.253 times greater than mothers who were not anemic in pregnancy. Therefore, it is necessary to perform proper handling of anemia in pregnant women to prevent postpartum hemorrhage.

Keywords: Anemia, Hemorrhage, Pregnancy.

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1. INTRODUCTION

Maternal Mortality Rate (MMR) is one indicator to perceive the success of maternal health efforts (Sassanarakkit, Kaiwong & Chittacharoen, 2019). MMR is the ratio of deaths during pregnancy, childbirth, and the puerperium affected by pregnancy, childbirth, and the postpartum period or its management but not due to other causes as accidents or falls in every 100,000 live births (Ariyanti, Yulianti & Padlilah., 2021). In addition to calculating maternal health programs, this indicator is also able to calculate the degree of public health due to its sensitivity to enhance health services, both in terms of accessibility and quality (Kementerian Kesehatan Republik Indonesia, 2019). In general, there was a decrease in maternal mortality during the period 1991-2015 from 390 to 305 per 100,000 live births. Although there is a downward trend in MMR, it has not succeeded in acquiring the MDGs target which must be attained at 102 per 100,000 live births in 2015 (Kementerian Kesehatan Republik Indonesia, 2019). Efforts to accelerate the decline in MMR can be performed by assuring that every mother is able to access quality maternal health services, such as health services for pregnant women, delivery assistance by skilled health personnel in health care facilities, postpartum care for mothers and babies, special care and referrals if complications occur and family planning services, encompassing postnatal family planning (Kementerian Kesehatan Republik Indonesia, 2019).

According to WHO, the cause of MMR is 81% due to complications during pregnancy and childbirth, and 25% of maternal deaths are affected by postpartum hemorrhage and an approximately 100,000 deaths each year (World Health Organization, 2020). MMR in Indonesia is quite high. In Southeast Asia, Indonesia ranks second after Laos. The causes of death in Indonesia are hemorrhage which was 28%, eclampsia 24%, infection 11%, abortion 5%, prolonged labor 5%, embolism 3%, puerperal complications 8%, and the rest because of other causes (Kementerian Kesehatan Republik Indonesia, 2020). In accordance with the research administered by the University Teaching Hospital during 2000-2014 in Brazil, the most mortality complications in cases of severe aplastic anemia were hemorrhage and infection (Putra & Aprijadi, 2019). Several studies have uncovered that anemia in pregnant women affects postpartum hemorrhage (Subratha, 2022). Meanwhile in Tarakan, North Kalimantan, hemorrhage is the largest contributor to MMR, which is 50% (Dinas Kesehatan Kota Tarakan, 2020)

Hemorrhage in childbirth is due to anemia in pregnancy. It occurs because when the mother gives birth, adequate uterine contractions occur for the baby to be born. Pregnant women who are anemic with Hb below 10, experience a significant high risk of hemorrhage due to hypotonia or atony, about 20-25 percent (Subarda, Hakimi & Helmyati, 2011). Postpartum hemorrhage is bleeding exceeding 500 ml after the baby is born in vaginal delivery and exceeding 1000 ml after abdominal labor before 6 weeks of delivery (Oktariza, Flora & Zulkarnain, 2020). Iron needs escalate exponentially during pregnancy to fulfill the increased demands of the fetoplacental unit, to expand maternal erythrocyte mass, and to compensate for iron loss at delivery in more than 80% of countries in the world (Lee & Okam, 2011). The Hb level drops as bleeding increases. The blood provides the uterus with the oxygen and energy required to contract. The ability to contract is weakened as the supply of these needs becomes thinner (McLean et al., 2009). Anemia in pregnant women not only increases the risk of maternal death but also of preterm birth, infant mortality, and infectious diseases. The growth and development of the fetus or child both during pregnancy and after delivery can be impacted by the mother's iron deficiency anemia (Fitriany & Saputri, 2018). According to a preliminary study at Juata Public Health Center, there were 11 cases of anemia among pregnant

women in 2021 (January through February), and 25 pregnant women were affected by 1 case of primary postpartum hemorrhage. This research aims to a study the Relationship of Anemia during Pregnancy with Primary Postpartum Hemorrhage Incidence in Juata Tarakan Public Health Center.

2. RESEARCH METHOD

The type of research employed is an analytic survey with a case-control design. The research location is at Juata Tarakan Public Health Center. The independent variable in this study was the incidence of anemia, and the dependent variable was primary postpartum hemorrhage. The population were all pregnant women who visited the obstetrics and gynecology polyclinic in 2020 which was obtained from secondary data, the patient's medical record book at Juata Public Health Center with a sample of 271. The sampling administered a non-probability technique understood as total sampling since this study employed secondary data. The researcher collected samples from the entire population, data analysis was performed univariately and bivariately with chi-square test. This study implements ethical principles and has acquired ethical approval at Universitas Borneo Tarakan, with ethical test number 06/KEPK-FIKES UBT/III/2021.

3. RESULTS AND DISCUSSION

The subjects of this study were 271 pregnant women who checked themselves at Juata Tarakan Public Health Center, North Kalimantan in 2020.

Table 1. The characteristic of the subjects.

Characteristics	Frequency (n)	Percentage (%)
Parity		
Primigravida	77	28.4
Multigravida	194	71.4
Age		
20-35	213	78,6
<20 & >35	58	21,4
Anemia		
No anemia	226	83,4
Anemia	45	16,6
Type of Delivery		
Vaginal	250	92,3
Sectio Caesarea	21	7,7
Delivery Place		
Hospital	78	28,8
Public Health Center	151	55,7
Clinic	13	4,8
Independent Midwife Practices	29	10,7
Labor Complications		
No Complications	254	93,7
Complications	17	6,3

Characteristics	Frequency (n)	Percentage (%)
Postpartum Bleeding		
No Bleeding	236	87,1
Bleeding	35	12,9

Table 1 show that the frequency distribution of research subjects uncovered that most of 194 (71.4%) were pregnant more than once or multigravida, most of the pregnant women were of reproductive age 20 -35 years old 213 (78.6%), most of the pregnant women did not experience anemia 226 (83.4%), most of pregnant women gave birth normally 250 (92.3%), almost half of the respondents gave birth at the health center 151 (55,7%), a small proportion of respondents 17 (6.3%) suffered from complications during delivery and 35 (12.9%) experienced bleeding during delivery.

Table 2. Effect of Anemia in Pregnancy on Postpartum Hemorrhage

Pregnancy	Postpartum Bleeding		Odds Ratio	CI 95%
	No Bleeding n=236	Bleeding N=35		
No Anemia	211 (93,4%)	15 (6,6%)	11,253	5,120-
Anemia	25 (55,6%)	20 (44,4%)	1	24,732

Table 2 show that the results of the statistical tests demonstrated that pregnant women with anemia owned an 11,253 times greater risk of hemorrhage during labor than women without anemia.

Table 3. Effect of Confounding Variables on Postpartum Hemorrhage

Variable	Postpartum Bleeding		Odds Ratio	p-value
	No Bleeding n=236	Bleeding N=35		
Parity				
Primigravida	71(92,2%)	6 (7,8%)	2,080	0,159
Multigravida	165 (85,1%	29(14,9%)	1	
Age				
20-35	87(87,8%)	26(12,2%)	1,321	0,511
<20 & >35	49 (84,5%)	9(15,5%)	1	
Type of Delivery				
Vaginal	215(86%)	35 (14%)	0,860	0,134
Sectio Caesaria	21(100%)	0 (0%)	1	

Table 3 show that the result of the statistical test showed parity, age, and type of delivery did not affect Postpartum Hemorrhage. The incidence of postpartum hemorrhage in pregnant women with anemia at Juata Public Health Center in Tarakan throughout 2020 was 44.4%. Pregnancy anemia possessed a significant effect on the incidence of postpartum hemorrhage with p-value = 0.000 and OR = 11.253. It indicates that mothers with anemia in pregnancy experience a risk of postpartum hemorrhage 11.253 times greater than mothers who are not anemic. It is in accordance with research administered by Wardani in 2017 in which the research she conducted demonstrated a significant relationship between anemia and postpartum hemorrhage, with anemia at risk of experiencing postpartum hemorrhage 17.6 times for postpartum hemorrhage compared to mothers who did not experience postpartum hemorrhage due to anemia (Wardani, 2017), (Onyeneho & Igweonu, 2016). There is 8 to 10-fold increase in MMR when the Hb falls below 5 g/dl. Early detection and effective management of anemia in pregnancy may affect substantially to decrease the maternal mortality (Al-Khaffaf et al., 2020). It is in

accordance with this study because anemia experienced during pregnancy escalates the risk of hemorrhage in childbirth.

Pregnant women with anemia are not able to fulfill the iron requirements of the body. It may affect interference and inhibition of body cells encompassing brain cells, and cause health problems for the mother and fetus. Iron deficiency anemia accounts for 75% of all anemias in pregnancy. Hence, it is recommended to administer oral iron supplementation treatment of iron deficiency anemia in pregnancy (Igbinosa, Berube & Lyell., 2022). The following are the impact of anemia in pregnancy associated with various sources and experts, encompassing anemia in pregnancy which leads to miscarriage, premature birth, low birth weight, hemorrhage before and after childbirth can even cause maternal and child death (Onyeneho & Igweonu, 2016). The impact of anemia on pregnancy varies from tremendous mild complaints to disturbances in the pregnancy continuity (abortion, immature or premature labor), disorders of the delivery process (uterine atony, prolonged labor, hemorrhage), disorders during puerperium (subinvolution, resistance to infection, stress, and low breast milk production), and fetal disorders (dysmaturity, microsomia, low birth weight, perinatal death, etc.). Perception plays a pivotal role in determining health-seeking behavior (Risnawati & Ningrum, 2015)

Mothers suffering from anemia in pregnancy possess fewer red blood cells than required. Without enough red blood cells or a reduced effective number of red blood cells, the blood will not clot. It implies that a person may experience hemorrhage excessively even if it is only slightly injured. Mothers who are in labor condition with low hemoglobin (Hb) concentrations may experience an even faster decrease in Hb if bleeding happens, no matter how small it is (Yasin, Hannan & Wahyuni, 2021), (Maesaroh & Iwana, 2018). Anemia occurs in 1/3 of women during the third trimester of pregnancy (Nuryawati & Budiasih, 2017). General causes are iron and folic acid deficiency (Sharifzadeh et al., 2018). The amount of blood in the body of a pregnant woman expands by 20-30%, thus requiring an increase in iron supply. It is crucial in this period to conduct a Hb check to detect anemia. Anemia in pregnant women greatly influences the condition of mother and fetus during the delivery process. Pregnant women suffering from severe anemia increase the risk of maternal and infant morbidity and mortality. The possibility of giving birth to babies with low birth weight (LBW) and premature is also more prominent (Subarda, Hakimi & Helmyati, 2011) (Stephen et al., 2018).

Mothers with anemia can precede the postpartum hemorrhage occurrence. This condition is affected by the process of hemodilution during pregnancy causing the blood to occur diluted (Lee & Okam, 2011)The effect of this event affects less oxygen bound in the blood, hence, the amount of oxygen delivered to the uterus is decreased. It may cause the uterine muscles enable to contract adequately. Therefore, it affects postpartum hemorrhage. In progressive iron deficiency anemia, there are changes in hematological and biochemical values. The first thing happening is a decrease in iron stores in the tissues. This decrease is signified by a decrease in serum ferritin, a protein which binds iron in the body as storage (Sumiaty, Udim & Aminuddin, 2018). Then, if the amount of serum iron will decrease, the iron-binding capacity of the serum (serum transferrin) will increase, and transferrin saturation will also decline below normal. As stores decrease, iron and protoporphyrin fail to form heme. Free erythrocyte protoporphyrin (FEP) accumulate, and hemoglobin synthesis is disrupted (Fibrila, 2018), (Pratiwi, Santoso & Wahyuningsih, 2018).

At this point, iron deficiency progresses to iron deficiency anemia. With a decreased amount of hemoglobin in each cell, the red cells become smaller. These morphological changes most frequently occur in conjunction with a decline in the mean corpuscular

volume (MCV) and the mean corpuscular hemoglobin (MCH) (Sulistyoningtyas & Cahyawati, 2020). Changes in the size variation of red blood cells occur with the replacement of normocytic cells with microcytic cells. This variation is signified by the increase in red blood cell distribution width (RDW). The number of red blood cells will also decrease (Nur, Rahman & Kurniawan, 2019) (Yasin, Hannan & Wahyuni, 2021). The number of reticulocyte percentages increases slightly or maybe normal. A blood smear will present hypochromic and microcytic red blood cells with constant cell variation. The elliptical or cigar-like shape of the blood cells is generally identified. The detection of an increase in transferrin receptors and a decline in reticulocyte hemoglobin concentration corroborates the diagnosis of iron deficiency (Fitriany & Saputri, 2018), (Moya et al., 2022)

However, the variables of age, parity, and type of delivery in this study did not possess an influence on the incidence of postpartum hemorrhage at Juata Tarakan Public Health Center. It was not in accordance with the research performed by Wardani in 2017 which the three variables possessed a relationship with the incidence of postpartum hemorrhage. Furthermore, numerous studies evidence that pregnancy anemia affects the incidence of postpartum hemorrhage and it is a special concern for health workers particularly midwives, to generally examine the hemoglobin as a supporting examination in the 1st and 3rd trimesters. If anemia occurs in pregnancy, it can be immediately detected and treated. Furthermore, pregnant women are also required to consume a minimum of 90 tablets for blood during pregnancy (Kementerian Kesehatan Republik Indonesia, 2020) , (Hayati, Maidartati & Amelia, 2019).

4. CONCLUSION

The incidence of childbirth bleeding in pregnant women with anemia at Juata Public Health Center in Tarakan throughout 2020 was 44.4%. Anemia of pregnancy significantly caused the postpartum hemorrhage incidence with a value in which mothers with anemia in pregnancy experienced a risk of postpartum hemorrhage 11.253 times more significant than mothers who were not anemic. Suggestions for pregnant women and their families should be to maintain their pregnancy by performing routine efforts to apply antenatal care under antenatal care service standards such as administering examinations with the 10 T standard in healthcare workers. Health workers should also perform preventive treatments of anemia in pregnancy to prevent postpartum hemorrhage.

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