

**HEA-OR-109**

**ANEMIA DURING PREGNANCY AND PRETERM LABOR**

**Tecky Afifah Santy Amartha<sup>1</sup>**, Indri, Mulyasari<sup>2</sup>, Sigit Ambar Widyawati<sup>3</sup>,  
Yuli Sya'baniah Khomsah<sup>1</sup>

<sup>1</sup>*Semarang Health Polytechnic, Semarang, Indonesia*

<sup>2</sup>*Department of Nutritions, Ngudi Waluyo School of Health Science, Ungaran, Indonesia*

<sup>3</sup>*Department of Public Health, Ngudi Waluyo School of Health Science, Ungaran, Indonesia*

Corresponding author's email: tecky.afifah12@gmail.com

Preterm labor is the second major cause of neonatal mortality after anemia. This study aims to find the correlation between anemia during pregnancy and the incidence of preterm labor at Ambarawa Public Hospital. This was an analytical survey study with cross sectional approach. The population in this study was all mothers who gave birth at Ambarawa Public Hospital during the period of March to October 2013, counted for 817 respondents. Samples were derived by using probability sampling technique employed the simple random sampling. After checking samples' eligibility, 159 respondents were involved in the study. Chi-square test was used to find the correlation between anemia during pregnancy and the incidence of preterm labor.

The research found that most of pregnant women (73.6 %), were not anemic and did not experience prematur labor. Statistical test shown that there was no correlation between anemia during pregnancy and the incidence of preterm labor at Ambarawa Public Hospital.

**Keywords:** Anemia, Preterm Labor

## **1. INTRODUCTION**

Anemia among pregnant women remains a public health problems and requires an attention since it's associated with high incidence and complications that endanger both the mother and the fetus. World Health Organization (WHO) in 2008 found that 69.0 % of pregnant women in the world suffered from anemia, a slightly higher than it was found in Indonesia (44.3 %). Although lower than the global anemia incidence, this figure is still quite high given the state of Indonesia is including in the severe conditions. Based on data from Basic Health Survey (Riskerdas) in 2007, the prevalence of pregnant women who suffer from iron deficiency anemia was 24.5 %. This situation indicates iron anemia remains a health problem in community (MOH, 2008).

Preterm labor is responsible for 75% of all perinatal deaths and 50% of neurological disability found in infancy (Varney et al, 2007). In Western countries, up to 80% of neonatal deaths are due to prematurity, and in infants who survived 10% had problems in the long term. Problems that occur in preterm labor is not only perinatal death, but often accompanied by abnormalities, both short-term aberration or a long term. The disorder is often a long-term neurological disorders such as cerebral palsy, retinopathy, mental retardation, can also occur neurobehavioral dysfunction and poor school achievement (Saifuddin, 2009).

Results of data collection of WHO to Indonesia found that the cause of death of children under age 5 who occupy the first rank in 2010 is prematurity (25%) followed by other diseases (19%) and pneumonia (14%) (WHO, 2013). According to data of Basic Health Survey (Riskerdas) Ministry of Health in 2007, prematurity become one of the main causes of high perinatal mortality rate, which amounted to 32.3% in addition to other cause such disorders/respiratory disorders (35.9%) and sepsis (12.0%) (MOH, 2008). This study aims to find the correlation between anemia during pregnancy and the incidence of preterm labor at Ambarawa Public Hospital.

## 2. METHOD

The design of this research was analytic survey, research that attempts to explore how and why the phenomenon occurs (Notoatmodjo, 2010). The approach used in this study was a cross sectional approach, namely to find out how the relationship between the independent variables (risk factors) with a dependent variable (effect) by measuring instantaneous and there is no follow-up procedure or follow-up. Moreover, temporal relationship (correlation time) between the risk factors and the effects are not always drawn from the data collected (Sastroasmoro and Ismael, 2011).

The population in this study were all pregnant women giving birth at Ambarawa hospitals from March to October 2013, counted for 817 respondents. While the sample in this study is a part of the population of pregnant women who give birth at Ambarawa hospitals from March to October 2013 that met the inclusion criteria and had no exclusion criteria set by the researchers. Inclusion criteria of this study are 1) mothers who gave birth spontaneously or by Cesarean Section from March to October 2013; 2) have a complete medical record in terms of hemoglobin levels before delivery and gestational age of the mother at birth. Mother with Gemeli, Polyhydramnios, placenta previa, placental abruption, IUFD (Intrauterine Fetal Death), had a history of abortion and premature, comorbidities of pregnancy, such as diabetes mellitus, hypertension and tuberculosis were excluded from the study.

Probability sampling method in which each subject in the population have the same chance of being selected or not selected as the sample (Nursalam, 2011) was employed. Simple random sampling was chosen since this method of sampling treated everyone equally with random manner without regard to strata that exist in members of the population (Hidayat, 2011). Of 817, a total of 159 women were randomly selected and involved in the study.

Blood was sampled when pregnant women came to hospital to delivery by a single draw of 3 ml of blood from antecubital veins. Blood was drawn in to vacutainer tubes containing 0,003 ml of EDTA (Ethylene Diamine Tetra Acetate) as an anticoagulant. Blood samples brought to the hospital laboratory after being taken from the respondent. Measurement were done by Sianmethemoglobin method (autoanalyzer), by automatically calculating the level of hemoglobin in erythrocytes, this method is widely used and have a stable standard (McPerson and Pincus, 2011). The results of measurements of hemoglobin will compare with the standard normal hemoglobin levels of pregnant women (11 g/dl or more) (WHO, 2011). Mothers who had hemoglobin level less than 11 g / dl is defined as anemia.

## 3. RESULT AND DISCUSSION

### 3.1. Characteristics of Respondents

Based on Table 1 it can be seen that of the 159 respondents in Ambarawa Hospitals, majority of respondents (80%) aged 20-35 years old. More than half (60%) were having

multigravida. In terms of socio-economic characteristics of respondents, more than half (59%) attained middle-high schools and the vast majority were unemployed.

Table 1. Frequency distribution some characteristic of respondent

Characteristic	n	%
Age		
<20 years	11	7
20-35 years	127	80
>35 years	21	13
Parity		
Primigravida	63	40
Multigravida	96	60
Educational level		
Primary school	59	37,1
Middle-high school	95	59,7
Collage	5	3,2
Employment status		
Work	27	17
Not Work	132	83

### 3.2. Anemia during Pregnancy

Table 2 shows that most of respondents' haemoglobin level was measured above 11 g/dL, indicates that most of them (73%) were not anemic.

Table 2. Frequency distribution of anemia on pregnancy

Anemia	N	%
Yes (Hb < 11 g/dL)	42	26,4
No (Hb ≥ 11 g/dL)	117	73,6

The result of the study showed a surprising finding, since many studies found many mothers were anemic during their pregnancy. It is perhaps, mothers' educational attainment prevent them from negative health outcomes related pregnancy such as anemia. A research conducted by Ordenes and Bongga (2006) reported that the level of maternal education can influence the incidence of anemia. The higher education, awareness to consume iron supplementation during pregnancy and maintain a healthy diet during pregnancy will be better, so the hemoglobin levels during pregnancy can be maintained in optimal conditions.

### 3.3. Preterm Labor

The vast majority of mothers (76%) did not experiencing preterm labor. This could be a good finding since low incidence of preterm labor indicates a better ante natal care and health services for women.

Table 3. Frequency distribution of preterm labor

Preterm Labor	N	%
Yes (22-37 weeks)	37	23,3
No (> 37 weeks)	122	76,7

Studies found that factors affecting the low incidence of preterm labor include age, parity and work. Maternal age, who are mostly of reproductive age is 20-35 years (80%). In accordance with the theory according to Hurlock B.E. (2002) in Hidajati (2012) the increasing age and level of maturity, the strength of a person's thinking and work will also be more mature. 20-35-year-old mother referred to as "adult life" and is also called reproductive life, which at this time people have been able to solve the problems faced with emotionally calm, especially in the face of pregnancy, labor, childbirth and care for her baby later. At this reproductive age, reproductive organs is mature and hormone balance is still optimal. This makes the process of conception, development of the fetus in the mother's womb until the baby is ready to be born to run well, so as to reduce the incidence of other risk factors that accompany pregnancy can harm both mother and fetus in the womb.

Based on data from respondents, the majority of respondents are multiparous (60%). This is consistent with the theory that preterm labor is more common in first pregnancies. It happened to be reduced by increasing the amount of parity pretty months to fourth parity (Krisnadi et al, 2009). Most respondents are housewives or unemployed (83%). This is consistent with the theory that maternal employment may increase the incidence of preterm birth either through physical exhaustion or stress arising from his work. This type of work that affect the increased incidence of prematurity is working too long, heavy physical work and the work can be stressful as dealing with customers or engage with the issue of money/cashier (Krisnadi et al, 2009). Housewife could choose chores they can carry during pregnancy. Opportunity to rest is also greater when compared with pregnant women workers who are already tied to a job, so inevitably pregnant women who work have to carry out their duties in accordance with its position in the workplace and must follow a predefined working hours at the place of work.

The low prevalence of preterm delivery in this study is also due to control other variables that can affect premature that women who experienced premature labor complicated by preeclampsia/ eclampsia, gemeli, polyhydramnios, placenta previa, placental abruption, IUFD, had a history of abortion or premature previously and mother with concomitant diseases of pregnancy such as diabetes, hypertension and tuberculosis, so the incidence of birth appearing in the sample becomes smaller. Based on data from the study, the majority of preterm labor in pregnant women who develop preeclampsia/ eclampsia and also pregnant women who have a history of previous miscarriage and premature delivery.

### 3.4. Corelation between Anemia during Pregnancy and Preterm Labor

Tabel 4. Corelation between anemia during prgnancy and preterm labor

Anemia	Preterm Labor						p-value	RP
	Yes		No		Total			
	n	%	n	%	N	%		
Yes	14	33,3	28	66,7	42	100	0,113	1,696
No	23	19,7	94	80,3	117	100		
Total	37	23,3	122	76,7	159	100		

Table 4 shows that among anemic mothers, only one third (33%) experienced preterm labor. Chi-square test showed there was no significant association between anemia during pregnancy and preterm labor, shown by the p-value  $0,113 > 0,005$ . The prevalence ratio (PR=1,696), although showed no significant different in the risk of preterm labor occurrence between anemic and non-anemic mother, it indicates that anemia in pregnant women increases the risk of preterm birth compared to non-anemic women.

These findings are consistent with research conducted by Lee et al (2006), about the relationship of iron status and relationship with the output of pregnancy which found that babies born to mothers with low hemoglobin levels tend to have low birth weight and not prematurely. On the contrary, another study conducted by Sukrat et al (2013) revealed that hemoglobin levels below 11 g/dL in pregnant women increases the risk of low birth weight in the first and third trimester, increased the risk of preterm birth in women who are anemic since the first trimester.

Results of research conducted by Zang et al (2009) showed that anemia in early pregnancy is associated with an increased risk of premature rupture membrane (PROM) and anemia in late pregnancy are associated with a decreased risk of spontaneous preterm birth. Adequate physiological hemodilution during mid and late pregnancy may be associated with a reduced risk of preterm labor. During pregnancy body will change the physiological one of which is the increased levels of blood plasma and erythrocytes. Plasma volume increased 75% and the volume of red blood cells increased by 33%. Before delivery, pregnant women will experience increased levels of hemoglobin up to 1.2 g/100 ml of blood until delivery and returned to normal levels on the first day postpartum if no abnormal blood loss (Varney et al, 2008). The increase can occur due to an increase in plasma erythropoietin which peaked during the third trimester and result in maximum production of erythrocytes (Cunningham, 2013). Maternal hemoglobin level of respondents who experienced anemia mostly mild anemia or anemia that is still physiologically with hemoglobin levels between 10 to less than 11 g/dl, namely a total of 32 respondents (76.2%). It can describe the process of hemodilution adequate in pregnant women before delivery.

The process of this hemodilution beneficial to adjust the enlargement of the uterus hypertrophy vascular system so that the metabolic needs of the uterus can be met. Hemodilution can provide nutrients and elements are plentiful, uteroplacental circulation can take place properly and needs nutrients and oxygen it needs the placenta and fetus can be met (Cunningham, 2013). This is exactly the possibility of resulting in anemia in the third trimester pregnant women are not associated with the incidence of preterm birth.

The possible conditions that cause premature labor anemia is anemia suffered by the mother early in pregnancy is not at the end of her pregnancy. Suffering anemia in pregnant women early in pregnancy were likely to continue into the next trimester due to hemodilution process. This will cause stress and hypoxia in the fetus that would result in the activation of the Hypothalamic–Pituitary–Adrenal) (HPA) will then maternal-fetal placental CRH stimulates increased. Increased CRH (Corticotropin-Releasing Hormone) causes increased production of prostaglandins that can trigger uterine contractions that result in the start of labor before the pregnancy term. CRH levels in women who had preterm delivery is higher when compared to mothers delivered at term age (Krisnadi et al , 2009).

Limitation of the study lies on the data hemoglobin levels of pregnant women are available most of the time only before delivery, so that the status of anemia in the previous trimester were not observable. Therefore, future studies need to consider the status of anemia based on hemoglobin levels each trimester in order to identify anemia trimester and how it has a relationship with preterm labor. The second limitation included inability to control all the variables that affect the incidence of preterm labor and other variables such as stress, inflammation and smoking (passive and active) among pregnant women.

#### 4. CONCLUSION

There was no significant association between anemia in pregnant women and the incidence of preterm birth in Ambarawa Hospitals. Anemia in pregnant women increases the risk of preterm

birth incidence 1,696 times compared to women who did not have anemia, but it is not statistically significant. Adequate process of hemodilution in pregnant women before delivery could be one of the reason. Adequate physiological hemodilution during mid and late pregnancy may be associated with a reduced risk of preterm labor. The present study suggests in the future study that hemoglobin measurements should be done in every trimester of pregnancy to find out the specific of how anemia can induce preterm labor.

### REFERENCES

1. Cunningham et al. (2013). *Obstetri Williams*. 23th Ed. Vol 2 . EGC, Jakarta.
2. Hidajati, A. (2012). *Mengapa seorang ibu harus menyusui?*. FlashBooks, Jogjakarta.
3. Hidayat, A. A. A. (2011). *Metode Penelitian kebidanan dan Teknik Analisis Data*. Salemba Medika, Jakarta.
4. Krisnadi et al. (2009). *Prematuritas*. PT Refika Aditama, Bandung .
5. Lee et al. (2006). "Iron Status and Its Association with Pregnancy Outcome in Korean Pregnant Women". *European Journal of Clinical Nutrition: Nature Publishing Group*; 60, 1130-1135.
6. McPherson, R. A., and Pincus, M. R. (2011). "Henry's Clinical Diagnosis and Management by Laboratory Methods (22 ed.)". Philadelphia: Saunder Elsevier.
7. Minister of Health (MOH). (2008). *Riset Kesehatan Dasar 2007*. Indonesian Minister of Health, Jakarta.
8. Notoatmodjo, S. (2010). *Metodologi Penelitian Kesehatan*. Rineka Cipta, Jakarta.
9. Nursalam. (2011). *Konsep dan penerapan Metodologi Penelitian Ilmu Keperawatan: Pedoman Skripsi, Tesis, dan Instrumen Penelitian Keperawatan*. 2nd Ed. Salemba Medika, Jakarta.
10. Ordenes, M. A. C. and Bongga, D. C. (2006). "Factors Influencing Compliance with Iron Supplementation among Pregnant Women". Vol 3, Nos 1 & 2. *Social Science Diliman: University of the Philippines*.
11. Rukiyah, A. Y., and Yulianti, L. (2010). *Asuhan Kebidanan IV*. CV Trans Info Medika, Jakarta.
12. Saifuddin, A. B. (2009). *Ilmu Kebidanan Sarwono Prawirohardjo*. 4th Ed. PT Bina Pustaka Sarwono Prawirohardjo, Jakarta.
13. Sastroasmoro, S., and Ismael, S. (2011). *Dasar-dasar Metodologi Penelitian Klinis*. Sagung Seto, Jakarta.
14. Sukrat et al. (2013). "Hemoglobin Concentration and Pregnancy Outcome: A systematic Review and Meta-Analysis". *BioMed Research International: Hindawi Publishing Corporation*.
15. Varney et al. (2007). *Buku Ajar Asuhan Kebidanan*. 4th Ed. Vol 1. EGC, Jakarta.
16. Varney et al. (2008). *Buku Ajar Asuhan Kebidanan*. 4th Ed. Vol 2. EGC, Jakarta.
17. World Health Organization (WHO). (2008). *WHO Global Database on Anemia*. Geneva: WHO Press. [http://whqlibdoc.who.int/publications/2008/9789241596657\\_eng.pdf](http://whqlibdoc.who.int/publications/2008/9789241596657_eng.pdf). [13 September 2013].
18. World Health Organization (WHO). (2011). *Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity*. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011 (WHO/NMH/NHD/MNM/11.1) (<http://www.who.int/vmnis/indicators/haemoglobin.pdf>, accessed [20 October 2013]).
19. World Health Organization (WHO). (2013). *Indonesia: Health Profile*. <http://www.who.int/gho/countries/idn.pdf>. [29 November 2013]
20. Zang et al. (2009). "Maternal Anaemia and Preterm Birth: a Prospective Cohort Study". *International Journal of Epidemiology: Oxford University Press*; 38:1380-1389.