ORIGINAL ARTICLE:

Anemia in the first trimester is associated with anemia during pregnancy in Sidotopo Wetan Community Health Center, Surabaya

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ABSTRACT

Objective: To analyze association between anemia in the first trimester and preeclampsia during pregnancy in Sidotopo Wetan Community Health Center Surabaya.
Materials and Methods: This study was a analytic case control study. The samples were 49 women with preeclampsia as case group and 49 women non-preeclampsia as control group. The data were secondary data collected from medical record of pregnancy women on Sidotopo Wetan Community Health Center Surabaya from January 2016 – Desember 2017. The analysis was done by Chi Square Statistics.
Results: 79,6% women in preeclampsia group and 93.9% women in non-preeclampsia group was not anemia in the first trimester. There is association between anemia in the first trimester and preeclampsia during pregnancy in Sidotopo Wetan Community Health Center Surabaya (p = 0.037; OR = 3.932 (CI 95% = 1.010 – 15.303)).
Conclusion: There is association between anemia in the first trimester and preeclampsia during preg-nancy in Sidotopo Wetan Community Health Center Surabaya.

Keywords: anemia, preeclampsia.

ABSTRAK

Tujuan: Menganalisis hubungan anemia trimester pertama dengan preeklampsia pada ibu hamil di Sidotopo Wetan Community Health Center Surabaya.
Bahan dan Metode: Penelitian case control dengan sampel meliputi 49 ibu hamil dengan preeklampsia untuk kelompok kasus dan 49 ibu hamil tidak preeklampsia untuk kelompok kontrol. Pengumpulan data dengan data sekunder dari data rekam medis pasien ibu hamil di Sidotopo Wetan Community Health Center periode Januari 2016 – Desember 2017. Analisa data dengan uji statistik Chi Square
Hasil: 79,6% ibu hamil preeklampsia dan 93,9% ibu hamil tidak preeklampsia tidak mengalami anemia pada trimester pertama. Ada hubungan anemia trimester pertama dengan preeklampsia pada ibu hamil di Sidotopo Wetan Community Health Center Surabaya (p = 0,037; OR = 3,932 (CI 95% = 1,010 – 15,303)).
Simpulan: Ada hubungan anemia trimester pertama dengan preeklampsia pada ibu hamil di Sidotopo Wetan Community Health Center Surabaya.

Kata Kunci: anemia, preklampsia

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INTRODUCTION

Preeclampsia is hypertension during pregnancy that develops after 20 weeks and it is accompanied by proteinuria.[1] Preeclampsia/eclampsia was the leading cause of maternal death in East Java in 2016 (30.90%) and the leading cause of maternal mortality in the last three years with an increasing trend. In 2016, the incidence of preeclampsia in Sidotopo Wetan Community Health Center Surabaya has increased more than 4 times compared to the previous years and became the highest in Surabaya for 2016 which was 113 cases.[2]

The cause of preeclampsia is still obscure. Maternal condition that may be a risk of preeclampsia is anemia. It can be explained that in anemia condition there will be decrease of oxygen transport to the tissues which can cause disruption of fetomaternal blood flow and will lead to hypoxia, oxidative stress and ischemic placenta.[3]

Anemia is a condition which the hemoglobin or red blood cell count is less than normal. Anemia in pregnancy is defined when woman has a hemoglobin level of less than 11 g/dL.[4] In 2016, the incidence of anemia during pregnancy in Surabaya was 7.5%. 216 cases of anemia during pregnancy was occurred in Sidotopo Wetan Community Health Center Surabaya, this number became the second highest in Surabaya in 2016.[2] Based on these problems, this study aims to determine the association between anemia in the first trimester with preeclampsia during pregnancy in Sidotopo Wetan Community Health Center Surabaya.

MATERIALS AND METHODS

This study was an analytic case control study. The population in this study were all pregnancies women at Sidotopo Wetan Community Health Center Surabaya in the period of January 2016 to December 2017 amount 2116 woman. The sample was divided into case and control group with a ratio of 1:1. The case group were 49 pregnancies women who were diagnosed pre-eclampsia by health workers at Sidotopo Wetan Community Health Center Surabaya, taken with total sampling. The control group were 49 pregnancies women who were not diagnosed preeclampsia by health workers at Sidotopo Wetan Community Health Center Surabaya, taken with simple random sampling. The inclusion criteria include pregnancies women who did antenatal care at Sidotopo Wetan Community Health Center Surabaya and registered in medical record and also pregnancies women who has examination data of hemoglobin level in the first trimester. The exclusion criteria include pregnancies women with a history of chronic hypertension, diabetes mellitus, obesity, and multiple pregnancy. Data collection used secondary data from medical record of pregnancies women on Sidotopo Wetan Community Health Center from January 2016 to December 2017. The analysis was done by Chi Square Statistics according to significance level of 95% (α = 0.05).

RESULTS AND DISCUSSION

Table 1 shows that most (53.8%) of pregnancies women aged 20-35 years were in the control group, most (55.7%) of pregnancies women with multigravidal status were in the case group, and most (54.3%) of pregnancies women with secondary education levels were in the control group.

Table 1. General characteristics of respondents

Characteristics	Respondents				Total	
	Case		Control			
	N	%	n	%	n	%
Age						
< 20	3	60	2	40	5	100
20 – 35	36	46.2	42	53.8	78	100
> 35	10	66.7	5	33.3	15	100
Gravida						
Primi	14	42.4	19	57.6	33	100
Multi	34	55.7	27	44.3	61	100
Grandemulti	1	35	3	75	4	100
Education						
Primary	23	53.5	20	46.5	43	100
Secondary	21	45.7	25	54.3	46	100
Higher Education	5	55.6	4	44.4	9	100

Table 2. Distribution of anemia in the first trimester of pregnancies women who were diagnosed preeclampsia at Sidotopo Wetan Community Health Center Surabaya from January 2016 to December 2017

Hb	N	%
Anemia	10	20.4
Non Anemia	39	79.6
Total	49	100
Min – Max	8.90 – 14.90	
Mean ± SD	12.08 ± 1.53	

Table 2. shows that pregnancies women who were diagnosed preeclampsia (20.4%) have anemia in the first trimester. The minimum value of Hb is 8.90 g/dL and the maximum value of Hb is 14.9 g/dL. Mean ± SD of 12.08 ± 1.53 describes the distribution of data varies from the average.

Tabel 3. Distribution of anemia in the first trimester of pregnancies women who were not diagnosed preeclampsia at Sidotopo Wetan Community Health Center Surabaya from January 2016 to December 2017

Hb	N	%
Anemia	3	6.1
Non Anemia	46	93.9
Total	49	100
Min – Max	10.0 – 15.60	
Mean ± SD	12.59 ± 1.08	

Table 3. shows that pregnancies women who were not diagnosed preeclampsia (6.1%) have anemia in the first trimester. The minimum value of Hb is 10.0 g/dL and the maximum value of Hb is 15.60 g/dL. Mean ± SD of 12.59 ± 1.08 describes the distribution of data varies from the average. Table 4. shows that almost all (76.9%) of pregnancies women who had anemia in the first trimester were in the case group, dan most (54.1%) of pregnancies women who had not anemia in the first trimester were in the control group.

Anemia in pregnancy is defined when woman had a hemoglobin level of <11g/dL in the first and third trimester, and also <10.5 g/dL in the second trimester.[5]

Based on Table 4. it is known that almost all (76.9%) of pregnancies women who had anemia in the first trimester were diagnosed preeclampsia. This is similar to the previous study of association between anemia with preeclampsia/ eclampsia in Banda Aceh, which is 85% of pregnancies women who were diagnosed preeclampsia/ eclampsia had anemia, and the study revealed that there is an association between anemia with preeclampsia/eclampsia (p <0.000).[6]

Anemia in pregnant women is often caused by iron deficiency, and pregnancies women who had iron deficiency anemia will have higher risk of pre-eclampsia.[4] The amount of iron in the body of a normal woman will not be enough to comply the iron necessary during pregnancy, therefore we need to take an exogenous iron in the form of iron supplementation to help pregnancies women sufficient iron necessary during pregnancy, so it can reduce the risk of iron deficiency anemia. Anemia means that there is a deficiency of hemoglobin which becomes the carrier of O2 in the blood, if there is deficiency of O2 in the blood it will cause hypoxia to death tissues that can cause oxidative stress and will involve clinical manifestation of preeclampsia by the form of hypertension and proteinuria.[3]

Based on statistical test using chi-square analytic, this study revealed that there is an association between anemia in the first trimester with preclampsia during pregnancy in Sidotopo Wetan Community Health Center Surabaya and also revealed that pregnancies women who had anemia in the first trimester was 3.9 times more likely to have preeclampsia than pregnancies women who had not anemia in the first trimester (p = 0,037; OR = 3.932 (CI 95% = 1.010 – 15.303)). The results are related to studies in Ethiopia, which found that pregnancies women who had anemia in the first trimester have a 2.5 times greater risk of preeclampsia than pregnancies woman who had not anemia in the first trimester (OR = 2.47, CI 95% = 1.12 – 7.61).[7] Another studies in Sudan also suggested that the risk of preeclampsia was 3.6 times higher in pregnant women with severe anemia (<7 g / dL) than non-anemic pregnant women (OR = 3.6, CI 95% = 1.4 – 9.1).[8]

Tabel 4. The association between anemia in the first trimester with preeclampsia during pregnancy in Sidotopo Wetan Community Health Center Surabaya from Januari 2016 to Desember 2017

Anemia	Respondents						*p value*	OR
	Case		Control					
	n	%	n	%	n	%		
Anemia	10	76.9	3	23.1	13	100	0.037	3.9
Non Anemia	39	45.9	46	54.1	85	100		

Previous studies of pregnant rates have shown that iron deficiency anemia increases signs of hypoxia and inflammation in the placenta, and also increases oxidative stress in fetus and placenta.[9] Oxidative stress is caused by an imbalance between oxidants and antioxidants, then placenta and placental factors will induce oxidative stress and endothelial cell dysfunction.[10] The endothelium produces the most important vasoactive mediator called Nitric Oxide (NO) which will regulate the mechanism of vasodilation of blood vessels.[11] In addition the function to transport O2, hemoglobin also binds to other compounds which is NO.[12] When the hemoglobin level in the blood is low or in anemia condition, it will cause the decrease of NO. The decrease of NO, accompanied by other factors due to endothelial dysfunction such as decreased prostacyclin and increased endothelin will lead to vasoconstriction of blood vessels that can lead to an increase in blood pressure which is one of the clinical manifestations of preeclampsia.

CONCLUSION

There is an association between anemia in the first trimester with preclampsia during pregnancy in Sidotopo Wetan Community Health Center Surabaya. Pregnancies women who had anemia in the first trimester was 3.9 times more likely to have preeclampsia than pregnancies women who had not anemia in the first trimester.

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