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http://heanoti.com/index.php/hn RESEARCH ARTICLE URL of this article: http://heanoti.com/index.php/hn/article/view/hn20508 Intake of Folic Acid During Pregnancy Correlates to Preeclampsia Incidents in Health Center of Surabaya Putri Ulin Nuha1, Bambang Purwanto2 (CA), Rizki Pranadyan3, Dwi Purwanti4 1Department of Midwifery, Faculty of Medicine, Airlangga University, Indonesia 2(CA)Department of Medical Physiology, Faculty of Medicine, Airlangga University, Indonesia; bambang-purwanto@fk.unair.ac.id (Corresponding Author) 3Department of Obstetrics and Gynecology, Faculty of Medicine, Airlangga University, Indonesia 4Department of Midwifery, Faculty of Medicine, Airlangga University, Indonesia ABSTRACT Maternal Mortality Rate (MMR) in Indonesia based on 2015's Health Profile of Indonesia has reached 305 per 100,000 live births. Preeclampsia is known being one of the most related factors of MMR Studies suggest that the use of folic acid may lower the risk of hypertensive disorders in pregnancy. It has been suggested that folic acid and Folic acid containing multivitamins may reduce the risk of preeclampsia by lowering plasma homocysteine concentrations in pregnant women. This cross sectional study aimed to analyze the correlation between intake of Folic acid with preeclampsia. Data was taken using Food Frequency Questionaire (FFQ) with semi quantitative approach by interviewing subjects. Sampling was obtained by simple random sampling with total 80 subjects. Data was analyzed using Chi square test. There were 15% of subjects diagnosed with preeclampsia and 83.3% of women with preeclampsia were deficient of Folic acid. Data analysis showed there is correlation between intake of Folic acid during pregnancy with preeclampsia in Sidotopo Wetan Health Care Centre (p= 0.028), while OR value was 0.158 (95% CI 0.032 to 0.776). It can be concluded that insufficient intake of Folic acid during pregnancy correlate to preeclampsia incidents. Keywords: Folic Acid, Preeclampsia, Incidents, Pregnancy INTRODUCTION Background Preeclampsia and eclampsia still become prominent obstetric problems in Indonesia that lead to a raise morbidity and mortality rate of mother and baby beside infection and bleeding(1). Preeclampsia can be found in 3- 7% of all pregnancies, statistically

different in some countries(1). Indonesian Health Profile on 2015 showed maternal mortality rate has reached 305 per 100.000 live births, preeclampsia being the second highest cause with 27.1% cases(2). Surabaya, second biggest city in Indonesia, records high rate for preeclampsia. Regional office of Department of Health in Surabaya said that there were 1170 cases in 2014 and slightly decreasing in 2015 with 1145 cases. Unfortunately, an increase occurred in 2016 with 1411 cases. One of the regions in Surabaya with the highest case of preeclampsia is Sidotopo Wetan Health Care Centre with 113 cases in 2016. Introductory data taken in Sidotopo Wetan Health Care Centre showed 72 high-risk cases of preeclampsia from 428 pregnancy in January-September 2017, and only 3 out of 10 pregnant women with sufficient intake of Folic acid(3). Preeclampsia in pregnancy can increase the risk of morbidity from 10 per 100,000 to 230 per 100,000 live births. Preeclampsia can cause some complications in pregnancy such as deficiency of plasma fluid that result in vascular disorders, kidney disorders, haematological disorder, cardiovascular disorder, HELLP syndrome (Hemolysis, Elevated Liver Enzymes,Low Platelet Count), and poor outcome for fetus with neural tube formation and foetal growth, and intrauterine fetal death at worst(4). Folic acid-containing supplements or food with vitamin B12 and vitamin B6 may reduce the risk of preeclampsia by lowering plasma homocysteine concentrations in pregnant women with 25% percentage of Folic acid, B12 7%, and no significant effect of B6 (5-6). Hyperhomocysteinemia induces maternal endothelial dysfunction leading to the development of hypertensive disorders(7). It occurs when disorder forming of methyl-tetrahidrofolat by methylation-tentrahidrofolat, resulting in functional deficiency of Folic acid and causing re-methylation failure of plasma homocysteine to methionine. People with variant methylene-tetra-hydro-folate reductase abnormal will not be diagnosed with hyper-homo-cysteine-emic if there is higher intake of Folic acid than usual(8). In the other hand, deficiency of vitamin B12 can also disturb metabolism of Folic acid resulting in functional deficiency of Folic acid and affecting methionine synthase, which make an accumulation of homocysteine so that Folic acid was trapped as methyl-tetra-hydro- folate(8). Several studies that have examined the association between the use of folic acid and risk for preeclampsia observed significant number of lowered risk for women who took Folic acid supplements or had high dietary folate intake in pregnancy(9-10). One study did not show significant difference between the beginning of Folic acid- containing multivitamins intake before or after conception(5). However, This study mainly focused on relation between intakes of Folic acid during pregnancy with preeclampsia by interviewing some subject in Sidotopo Wetan Health Care Centre. Purpose This study is aimed at analysing the intake of Folic acid during pregnancy with preclampsia in pregnant women at Sidotopo Wetan Health Care Centre in Surabaya City. Specifically, it purposes to 1) identify the numbers of preeclampsia cases in pregnancy, 2) evaluate the intake of Folic acid during pregnancy in pregnant women, 3) analyse the correlation between intake of Folic acid during pregnancy with preeclampsia in pregnancy in Sidotopo Wetan Health Care Centre. METHODS The population for this cross sectional study were 100 pregnant women in Sidotopo Wetan Health Care Centre during antenatal visit around 5th Feb – 23th Feb 2018, while the sample size in this study can be explained by using cross sectional 2 proportion formula 11. The minimum sample required for this research was 80 subjects selected by simple random sampling with inclusion criteria as in multigravida and willing to be a subject and exclusion criteria that is pregnant women with no history of hypertensive disease both in recent pregnancy, in the last pregnancy or before pregnancy, obesity, no smoking and alcohol consumption and no history of taking antacid, aspirin, and sulfasalazine. Independent variable in this study is the intake of Folic acid and dependent variable is preeclampsia in pregnancy. The primary data was directly obtained from interviewing subjects using food frequency

questionaire with semi quantitative approach, and the secondary data was obtained from medical diagnosis done by obgyn specialists or GP doctors. The data analysis was processed using Chi-square test with significant value at 5%. All protocol were clearly ethical approved to be conducted under supervision of health researcher ethic committee in Faculty of Medicine, Airlangga University with registered number 5/EC/KEPK/FKUA/2018. RESULTS Intake rate of Folic acid in pregnant women at Sidotopo Wetan Health Care Centre was relatively equal (50%). While the outcome states that 85% of subject did not show the sign of preeclampsia. It were shown at the table 2 as univariate analysis result on the distribution of subject outcomes and folic acid intake. Table 2. The Distribution of subject at Sidotopo Wetan Health Care Centre on 5th Feb – 23th Feb 2018 Variable Category Frequency Percentage Intake of Folic Acid Adequate 40 50 Inadequate 40 50 Outcomes None 68 85 Preeclampsia 12 15 Table 3. The correlation between subject outcomes of preeclampsia with folic acid intake at Sidotopo Wetan Health Care Centre on 5th Feb – 23th Feb 2018. Intake of Folic Acid Outcomes None Preeclampsia Total p value Odds Ratio Adequate 38 (55.8) 2 (16.6) 40 Inadequate 30 (44.2) 10 (83.4) 40 0.028 0.158 Total 68 (100) 12 (100) 80 It showed that the rate of subjects with preeclampsia who had inadequate intake of Folic acid was 83.4%. The p-value was 0.028 (there was significant correlation between intake of Folic acid and preeclampsia). Adequate intake of folic acid decreased on risk of preeclampsia outcomes. DISCUSSION The result in this study showed that there was correlation between intake of Folic acid during pregnancy and preeclampsia incidents in Sidotopo Wetan Health Care Centre, furthermore odd ratio value showed that intake of Folic acid during pregnancy was one of risk factors of preeclampsia incidents. Folate supplementation has been used to reduce the incidence of neural tube defects(4). Folate deficiency and hyperhomocysteinemia have been implicated as risk factors for the subsequent development of preeclampsia and other placental-mediated diseases(8). Indeed, preeclampsia-complicated pregnancies display placental alterations of the metabolism of folic acid and lower folate and higher homocysteine (Hcy) plasma levels(12). Folate is a term that refers to a group of water-soluble vitamins of the complex B which can be naturally found in foods such as leafy green vegetables, citrus fruit and liver(13). Folic acid, the synthetic and completely oxidized form of folate, is used in vitamin supplements and in fortified cereal products 13. Within the cells, folates act as cofactors in reactions which are determinant in cell division and cell maintenance, as well as in the regulation of gene expression through epigenetic mechanisms(8). Indeed folates are a source of s-adenosylmethionine, the main cellular methyl donor that modulates genome-wide methylation thus regulating the expression of genes. This is believed to be the process by which folates affect foetal programming. In addition, folates have a determinant role in the re-methylation of plasma homocysteine to methionine(13). It is known that at 0.6 mg/day, all the oxidized form of Folic acid is converted into biologically active metabolities during absorption, and so its consumption is generally considered safe(14). Zappacosta et al., (2013) conducted an open randomized double-blind clinical trial for 13 weeks with 149 people of hyper-homo-cysteine-emic. The samples were divided into 2 groups, for group 1 they were given 200 mg/day with dietary intake of folic acid and group 2 they were given placebo(15). The results showed the level of homocysteine will be decreased if they take therapy of Folic acid. In other study, the result stated that pregnant women with insufficient consumption of Folic acid during pregnancy would be at increased risk of preeclampsia (p-value= 0.03)(5). Based on the result of several studies, theories, and related journals, all stated that there is correlation between intake of Folic acid during pregnancy and preeclampsia incidents. Pregnant women with folic acid deficiency are indeed at risk of preeclampsia incidents, even though other causes of preeclampsia should be observed properly as well.

Limitations of this study should be considered. First of all, cross sectional approach used in this study has limited description of all phenomenon about preeclampsia, future research using cohort is expected in order to analyze on deeper perspective of how risk factors affect the incident. Lastly, there were difficulties to collect the proper data only from interviewing the subject because this food frequency questionnaire's answers are highly depended on memory of subjects. Subject must remember how much and how often they eat food containing Folic acid for the past three months. Level of Folic acid on food depends on how subjects cook their food because Folic acid is easy to degrade on high temperature. CONCLUSION Based on the results of this study, it can be concluded that the intake of Folic acid is significantly correlated to preeclampsia incidents at Sidotopo Wetan Health Care Centre in Surabaya city. We recommend that pregnant women or women planning for pregnancy to consult with their physician for their Folic acid requirements during pregnancy. As this study supports decreased incidents of preeclampsia with increased intake of Folic acid, we also recommend that physicians encourage women to continue using folic acid throughout their pregnancy. Furthermore, future research can be beneficial to take the sample with further laboratory-supported tests to find the accurate level of Folic acid. REFERENCES

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