

CONSUMPTION OF FE-FOLAT WITH BANANA TO THE HAEMOGLOBIN LEVELS AND SIDE EFFECTS ON PREGNANT WOMAN

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Abstract : Pregnant woman is one group anemia risk. The government policy in supplement tablet fe-folat at least 90 tablet during pregnant. Iron tablet consumption can generate side effects that annoying as nausea, vomiting, abdominal cramps, and constipation. Research purposes to know the influence of iron tablet consumption and folic acid with bananas against elevated levels of haemoglobin and side effects on gastrointestinal pregnant women. Experimental research (one group pre-posttest design). Sample of 24 pregnant women with < 20 weeks of pregnancy age criteria, no KEK, pregnancy distance > 2 years, and pregnant mother age is 20-35 years. Variables that measure is pre-post Hb levels and side effects on the gastrointestinal tract, nausea, vomiting, and constipation. Hb levels were analyzed with Paired T-Test and side effects were tested by Mc Nemar ($\alpha = 0.05$). Result of research, mean of Hb level of pre 11.71 gr% and post 12.66 gr% (mean increase is 0,95 gr%). Test Paired T-Tes, $t = -7.489$, $p < 0.001$. Side effect at the beginning of the first week, mild nausea vomiting (58.33%), and constipation (25.00%). At the end of the second week, mild nausea vomiting, and constipation (4.16%). Mc Nemar test result of nausea vomiting $p < 0.01$ and constipation $p > 0.05$. Consumption of iron and folate tablets with bananas can increase Hb levels quickly and can reduce side effects of nausea, vomiting, and constipation. It is recommended for health workers to improve education to pregnant women to consume iron tablets using bananas.

Keyword: Fe-folat, banana, Hb level, side effect

INTRODUCTION

During the period of pregnancy, the female body undergoes many changes and adaptations anatomically, physiologically, and biochemically. One of the physiological changes that occur is an increase in the blood volume of the mother about 30-50% in single pregnancy, and 50% in multiple pregnancies. Increased blood volume is dominated by blood plasma that is 75%, while the red blood cell volume only increased 33% that resulting in hemodilution. (Varney, 2007). Increased plasma volume is much more than red blood cells cause hemoglobin and hematocrit levels of pregnant women is low. Besides, the increasingly high iron requirement of pregnant mother that is 800-1000 mg during pregnancy for fetus, placenta and mother erythrocyte

formation have an effect on risk of iron deficiency and anemia.

WHO in 2012 estimated that the prevalence of anemia in pregnancy globally is 41.8% of all pregnant women, and in Asia 48.2% (ranked second world). In Indonesia, the prevalence of maternal anemia according to Riskesdas in 2013 is 37.1%, the proportion between urban and rural pregnant women is almost the same with 36.4% and 37.8%. Initial survey in September 2016 in Nguwok village, Modo Lamongan district, there were 5 out of 17 pregnant women examined (29.4%) had anemia.

The most common cause of anemia in pregnant women is iron deficiency. OGCCU (2013) explained that more than 90% of pregnancy anemia is due to iron deficiency. The underlying cause is the lack of iron intake in food, resorption disorders, impaired use or due

to too much iron coming out of the body due to bleeding (Syaifudin, 2014). It can also result from the interaction of some of these things.

Pregnancy anemia contributes to Maternal and Infant Mortality Rate because untreated pregnancy anemia has the potential to endanger the lives of both mother and baby. Impacts on the mother can cause miscarriage, premature labor, fetal growth restriction in utero, antepartum bleeding, and premature rupture of membranes, when labor may result in uterine contraction and acting power, prolonged labor, placental retention and bleeding. In the childbirth period there may be sub involution of uterine, hemorrhage, infection, lack of production and expenditure of breast milk, and may even cause sudden cordis decompensation after delivery (Manuaba, 2007).

Seeing the serious effects of pregnancy anemia, then anemia in pregnant women should not be considered trivial. Precautions should be taken and handling cases of anemia in pregnant women appropriately. Supplementation of iron tablets is one way that is considered effective to prevent and cope with anemia. Therefore, the Ministry of Health of Republic Indonesia make standard health care of pregnant women, one of the components is giving of blood booster tablets of at least 90 tablets (Fe₃) during pregnancy (Kemenkes RI, 2016). The dose is one tablet per day containing 200 mg of ferro sulphate (equivalent to 60 mg elemental iron and 250 µg of folic acid (Dinkes Jawa Timur, 2015).

Nationally, the coverage of pregnant women gets Fe₃ in the year of 2015 is 85.17%, and in East Java 85.80% (Ministry of Health Republic Indonesia, 2016). While in Lamongan regency, the coverage of pregnant women got Fe₃ tablet of 88.15% (Dinkes Lamongan, 2014). This figure is still below of the target that set by MDGs of 95% in 2014.

The above figures indicate coverage of pregnant women who got blood booster tablets 90 tablets, other problems are blood booster tablet is not sure be drunk by pregnant women for various reasons. Results Riskesdas (2013) obtained data of pregnant women who consume iron tablets in Indonesia amounted to 89.1%. Pregnant women who consumed Fe 90 day

tablets during pregnancy were only 33.3%. This indicates that the iron tablet supplementation program is still less successful.

According to Arisman (2010), one cause of iron tablet supplementation program tends to fail is because the consumption of iron tablets can cause side effects that interfere on some people so that one tends to disobey or not take iron tablets given. Masthalina (2011) in his research mentioned that the group of respondents given fe-folic acid tablets mostly (76.6%) are not obey, and there was a correlation between the obedience of Fe tablet consumption with the incidence of pregnancy anemia (Yanti, et al, 2015).

Consumption iron orally can cause gastrointestinal effects such as discomfort in the liver, nausea, vomiting, abdominal cramps, constipation, and feces color changes (Bayu, 2014). The results of Rahmanintyas (2015) showed that of 50 pregnant women who consumed iron tablets, 40% complained of nausea, 30% vomiting, 18% constipation, and 26% dizziness.

Iron is an essential micro-element needed for the body to form red blood cells (hemoglobin). The effect of iron tablet supplementation on increasing hemoglobin levels depends on the absorption of iron by the body. But the higher the absorption, the more often the side effects are felt. Iron preparations in the form of ferros are more easily absorbed, so generally iron tablets are given orally i.e. ferrous sulfate, ferrous gluconate and ferrous fumarate. In this research using iron tablets containing 200 mg of ferrous sulfate and 0.25 mg of folic acid given one tablet per day for 15 days, taken at night before bed by using medium size bananas (about 100 grams). Ferro sulfate is an iron compound that is relatively cheap and can absorb the body up to 20%. Iron absorption is affected by the condition of the gastrointestinal tract and the ingredients in the food. Gastric acidity can improve solubility and improve bioavaibility. In the intestine, iron absorption will be optimal at PH 6.75 (MOH, 2001). Low chloride acid in stomach and or the use of drugs such as antacid inhibit iron absorption. Organic acids, such as vitamin C, help change the shape of ferries into ferrous

forms so as to help absorb iron, vitamin C also forms iron-ascorbate groups that remain soluble at high pH in the duodenum. Amino acids contained in meat, chicken, fish also help the absorption of iron. While the factors that bind iron to inhibit its absorption are phytic acid and oxalic acid, tannins which are polyphenols (found in tea or coffee), and high-dose calcium supplements. It is recommended to drink iron tablets along with foods or drinks that contain vitamin C and on an empty stomach like between meals or bedtime so that iron can be absorbed properly (Susiloningtyas, 2011).

Folic acid has a role in increasing erythropoiesis (red blood cell production) so as to increase hemoglobin levels. Folic acid also plays a role in the formation of new cells and prevents birth defects in the fetus " defects neural tube" and regulates enzymatic reactions in amino acid synthesis. Darwanti (2011) in his research stated that 72.2% of pregnant women with low levels of folic acid, and 38.9% had an anemia. The need for folic acid in the pregnancy period increases five to ten times because of the transfer of folate of pregnant women to the fetus (Syaifudin, 2014). Folic acid cannot be synthesized by the body so that the fulfillment of its needs must be obtained from foods rich in folate and supplementation (Bayu, 2014).

Bananas have a complete nutritional content that is very good for the health of pregnant women and the fetus. Ingredients in bananas include folic acid and iron. Both substances are essential elements for hemoglobin synthesis. According to Khomsan (2008), iron content in bananas including non-heme iron but the type of iron in bananas 100% can be absorbed by the human body. Vitamin C in bananas will help the absorption of iron. Bananas also contain vitamin B Complex especially vitamin B6 which is a neuro transmitter synthesis of hemoglobin, and reduce the effects of nausea, plus the content of amino acid tryptophan which in the body will be converted into serotonin can improve mood and appetite. Soft texture and fiber content in bananas can help restore normal bowel function to reduce constipation. Bananas are also able to

neutralize stomach acid, and reduce stomach irritation (Desti, 2013).

Iron tablets are generally recommended to be taken with foods or drinks containing vitamin C such as orange juice to increase iron absorption. Bananas also contain vitamin C and other nutrients needed by pregnant women associated with erythropoiesis and smooth functioning of the gastrointestinal tract. Based on the above exposure, the research on consumption of iron tablets with bananas to increase hemoglobin levels and side effects on the digestive tract in pregnant women is very important. The study aims to analyze the effect of iron and folic acid tablet consumption with banana on the increase of pregnant women's hemoglobin level and its effect on gastrointestinal tract which include nausea, vomiting, and constipation.

METHODOLOGY

Type of research is experiment (one group pre-posttest design). Population source is pregnant women who checked in at BPM "I.S" Desa Nguwok, Babat, Kabupaten Lamongan. Research sample is some pregnant women who have age criteria 20-35 years, pregnancy age < 20 weeks, no KEK, no history of chronic disease, pregnancy distance > 2 years. The sample size was 24 pregnant women with simple random sampling technique. Exclusion criteria included severe nausea vomiting (hyperemesis gravidarum) and diarrhea > three days.

The variables measured were hemoglobin levels before and after intervention, and side effects on the gastrointestinal tract included nausea, vomiting, and constipation. Interventions given in the form of iron tablets (60 mg elemental iron) and folic acid 0.25 mg consumed with medium banana (weight + 100 grams), a dose of one tablet daily taken before bed, duration of 15 days.

The Hb level was measured by Hemoglobin Testing System Quick Chek and the observation sheet, while the side effects on the digestive tract using a checklist. To monitor that respondents routinely consume fe-folate with bananas each day, respondents are given a

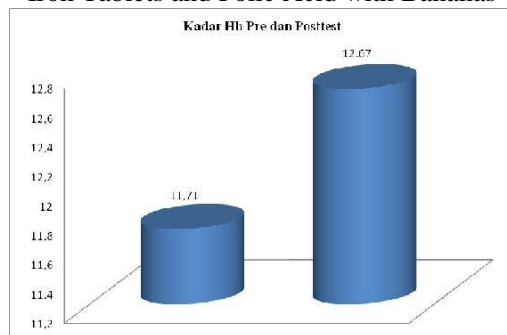
form to fill out after each fe-folat with bananas. Researchers also monitor at least every 3 days while giving bananas to respondents. Data of Hb level was analyzed with Paired T-Test because the scale of data ratio and normal distribution ($p > 0.05$), data of side effects of nausea vomiting and constipation were dichotomy so analyzed with Mc Nemar Test at 0.05 significance level using SPSS Version 16.0.

RESULT AND DISCUSSION

1. Pregnant Women's Hemoglobin Levels Before and After Taking Iron Tablets and Folic Acid with Bananas.

Diagram 1

Hb Pre and Post Levels Consumption of Iron Tablets and Folic Acid with Bananas



Based on Diagram 1 above, it is known that the average Hb concentration of pregnant mothers after the consumption of iron and folic acid tablets with bananas is higher (up) than the mean rate of previous Hb levels.

Tabel 1

Analysis Result of Consumption Influence of Iron Tablet and Folic Acid with Banana to Increase Hb Level

Mean Level	Hb	Min	Max	Difference Mean
Pre	11.71	9.30	14.10	0.95
Post	12.66	11.00	14.90	
T = 0.95, P = 0.000				

From the table 1 above, it can be explained that the average increase in Hb concentration of pregnant women after taking iron tablets and folic acid with bananas for 15 days amounted to 0.95 gr%. Paired T-Test test results obtained t value = -7.489 and $P < 0.001$, which means H_0 rejected.

Hb concentration of pregnant women greatly affects the condition of pregnancy of the mother and the fetus. Therefore, during pregnancy should be attempted so that mother's Hb levels remain normal. With the changes in the hemodynamic system of pregnant women's body that occurs hemodilusi, impact on the decrease in hemoglobin and hematocrit levels. Hb levels are influenced by iron adequacy and iron metabolism in the body. By consuming iron and folic acid tablets with bananas can prevent the decrease and even increase the pregnant women's Hb levels. The results of Table 1 show that there was an increase of pregnant women's Hb level of 0.95 gr% after consuming of iron and folic acid tablets with banana for 15 days.

The government through the Ministry of Health Republic Indonesia has launched the standard of care for pregnant women, one of which is supplementation of blood booster tablets at least 90 tablets during pregnancy which containing 200 mg of ferrous sulfas, and 0.25 mg of folic acid per tablet. Fe-folate supplementation aims to prevent iron nutritional anemia, and given since the first contact or at least after the nausea complaints of vomiting have been reduced.

Iron is a metal element that the body needs to synthesize hemoglobin. The increased volume of red blood cells and hemoglobin mass during pregnancy is associated with the amount of available iron reserves. If the body lacks iron or iron nutritional anemia, the formation of red blood cells becomes smaller. In the absence of iron supplementation, Hb concentrations and hematocrit will drop considerably during haemodilution. Puskidnakes (2003) stated that without iron supplementation the mass of red blood cells increased by only 18% during pregnancy, while mothers who took iron supplements increased by an average of 30%. According Syaifudin (2002), giving iron tablets

60 mg per day can raise Hb level by 1 gr% per month.

In addition to iron, there are several other nutrients needed in the formation of red blood cells and hemoglobin such as folic acid, Cyanocobalamin, and a small amount of ascorbic acid, riboflavin and copper and hormone balance especially erythropetin (Yusniani, 2014). Folic acid (B9) is one of the water-soluble vitamin B complexes. Which has a role as an essential supplement in the synthesis of red blood cells and DNA / RNA replication so that the fulfillment of folic acid requirements for pregnant women is very important in order to prevent anemia and congenital defects in the fetus, especially neural tube defects. According to the Darwanti study in 2011, low levels of folic acid in pregnant women can lead to anemia (38.9%). Because folic acid plays a role in the synthesis of hemoglobin, then the consumption of iron tablets combined with folic acid will provide added value in raising Hb levels. Laksana (2012) suggested that the effectiveness of giving iron tablets to anemia of pregnant women is still low, the effectiveness of therapy is only 41.9%. Even, Putro (2010) concluded from the results of his research that the use of iron tablets in pregnant women did not increase hemoglobin levels, iron will more effectively increase the concentration of pregnant women's Hb when combined with other supplements. The above statement is supported by the Mukarromah study (2014) showing that there is a difference in the increase of pregnant women's hemoglobin levels given Fe only with Fe-folate, an increase of Fe-folate-treated Hb level of 0.5 g / dl and only Fe Gr / dl for two weeks. Aikawa et al (2007) study in Vietnam also proved that supplementation of 60 mg fe and 0.4 mg of folic acid in second and third trimester pregnant women was able to significantly increase Hb levels of 0.4 and 0.7 gr / dl ($p < 0.001$).

This research uses banana which is rich in nutrients. In addition to iron and folic acid, bananas also contain other nutrients that play a role in the synthesis of hemoglobin and iron metabolism, i.e. vitamin B complex, especially B6, and vitamin C. The role of vitamin C in

iron metabolism associated with absorption. Iron in the body in the absorption in the small intestine, especially duodenum, foods or drinks that contain vitamin C and some B vitamins can accelerate the absorption. One banana weighing 100 grams or medium-sized contain 10 mg vitamin C so that iron tablets are consumed with banana absorption will be better. The effect is the increase of Hb level becomes faster as in this research (table 1).

This research is relevant with some previous research, among others Alviani (2012) research that in the experimental group that is given sulfas ferrous tablets 200mg, folic acid 0.25 and vitamin C 50 mg once daily as 90 tablets have increased Hb level 0.9 gr%, Whereas in the control group only given iron tablets alone increased Hb level of 0.2 gr%. Similarly, Hariyadi (2015) research results, the increase of Hb levels in the intervention group given tablets plus blood and vitamin C for 1 month (1.09 g / dl) was higher than the control group.

Some literature stated that B6 is a neurotransmitter in the formation of Hb levels. Fatimah (2011) also stated that there is a significant relationship between consumption of iron tablets, vitamin C and B6 with hemoglobin levels of pregnant women ($p = 0.001$; $R^2 = 0.24$). Wondmikun (2005) in his research in Eutopia also found that in general pregnant women who visited prenatal clinics had serum vitamin B6 levels, and the presence of moderate anemia.

Consumption of bananas themselves can actually increase Hb levels because bananas contain complete micronutrients, such as iron, folate, vitamin B6 which is a Hb forming element. Result of research of Maesaroh (2014), banana of Ambon can increase blood Hb level of male mice. A dose of 0.4 g / 20gr bb of mice for 14 days may increase Hb levels by 15.6%, hematocrit levels and red blood cell count also rise.

2. Side Effects of Iron Tablets and Folic Acid Consumption with Bananas on Pregnant Women

2.1 Nausea Vomitting

Complaints of nausea vomiting was observed at the beginning of the first week of use of iron and folic acid tablets with bananas and at the end of the second week. At the beginning of the research, the data were grouped ordinal including not nausea-vomiting, mild, moderate and severe, but the results obtained by the two categories are not nausea-vomiting and mild nausea-vomiting. Because the data is dichotomous, so the researchers analyzed with Mc Nemar Test.

Table 2
 Mc Nemar Test Result Effect of Iron and Folic Acid Tablets with Bananas against Nausea Vomiting

First Week	Second Week		Amount
	Not	Mild	
Not	10 (41.67%)	0 (0.00%)	10 (41.67%)
Mild	13 (54.17%)	1 (4.16%)	14 (58.33%)
Total	23 (95.84%)	1 (4.16%)	24 (100.00%)
P = 0.000			

Based on Table 2 above, it is known that at the beginning of consumption of Fe and folic acid tablets with bananas, or at the beginning of the first week more than half (58.33%) of pregnant women experience mild vomiting, and in the second week only a small (4.16%) who experienced mild nausea vomiting. This means that many pregnant women do not experience nausea vomiting after consumption of iron and folic acid tablets with bananas. The result of analysis is P value <0.01, it means there is difference of nausea vomiting at the beginning of consumption of Fe tablet and folic acid consumption using banana by the second week. These data suggest that consumption of Fe and folic acid tablets using bananas can reduce the side effects of nausea and vomiting.

It is known that the consumption of iron tablets orally can cause unpleasant effects in some people, side effects that often appear associated with the digestive tract are nausea, vomiting, constipation, and feces color changes to black. The most common side effects are nausea and vomiting. It has been described above that bananas contain vitamin B 6 which is believed to reduce the complaints of nausea and vomiting although the mechanism is not known clearly. According to Murdiana (2016), vitamin B6 is the first choice of pharmacotherapy for nausea vomiting in pregnancy. Setiawan (1999) in Desti (2013) explains that banana is one of the fruits that have an important role in the fulfillment of vitamin B6 needs.

Bananas also contain high potassium. Potassium is required to maintain the chemical and electrical power responsible for muscle movement. The stomach and intestines contain muscle cells in the walls that push food through the digestive system. Low calcium levels make the muscles in the body including the stomach and intestines move slowly, causing nausea, vomiting, lack of appetite, bloating and abdominal pain. Therefore, taking iron tablets using bananas can reduce the effects of nausea and vomiting. This is relevant to Nafisah research (2015) that the consumption of Ambon bananas can reduce nausea of vomiting in first trimester pregnant women ($Z = -2.714$, $P = 0.007$).

2.2 Constipation

Tabel 3
 The result of Mc Nemar Test Consumption Effect of Iron and Folic Acid Tablets with Banana to Constipation

First Week	Second Week		Amount
	Not	Mild	
Not	16 (66.67%)	2 (8.33%)	10 (75.00%)
Mild	5 (20.83%)	1 (4.17%)	14 (25.00%)
Total	21 (87.50%)	3 (12.50%)	24 (100.00%)
P = 0.453			

Table 3 shows that in the first week of consumption of iron and folic acid tablets with bananas, six pregnant women (25%) had mild constipation, and by the end of the second week only one pregnant woman (4.17%) had mild constipation. Mc Nemar test results obtained p value > 0.05 , which means there is no difference in constipation complaints at the beginning of consumption of Fe and folic acid consumption using bananas until the end of the second week of consumption. These data indicate that Fe consumption using bananas does not increase the effect of constipation

Bananas include fiber-rich fruit, which is 26%. The fibers in the digestive tract cannot be digested because the human body is not equipped with enzymes that can digest fibers. Fiber also contains no nutritional value for the body but fiber has an important function for the body that stimulates normal intestinal tract activity. Ambarita research results (2014) stated there is a relationship between fiber intake with feces frequency, and consistency of feces ($p < 0.05$). Similarly, research Sholikah (2013), there is influence of high fiber diet to constipation ($p = 0.000$). Potassium contained in bananas also stimulates bowel movements. Thus consuming bananas greatly facilitate the process of removal or removal of feces from the colon so as to prevent and reduce constipation.

CONCLUSION

1. There was a significant increase in Hb levels after taking iron tablets and folic acid with bananas.
2. Consumption of iron tablets and folic acid with bananas can reduce the side effects of drugs in the digestive tract of nausea, vomiting and constipation.

It is advisable for health workers to educate pregnant women on how to drink fe tablets not only with foods or drinks containing vitamin C but with nutritional and vitamin-rich foods as well as rich in fiber such as bananas.

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