



THE INFLUENCE OF GIVING LIME (*Citrus Aurantifolia*) WITH FE TABLETS TO INCREASE HEMOGLOBIN LEVELS AMONG THE THIRD TRIMESTER OF ANEMIA PREGNANT WOMEN

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Abstract

Background: Problems caused by anemia in pregnancy range from mild complaints to severe complications. To prevent anemia, every pregnant woman is expected to get iron tablets at least 90 tablets during pregnancy to increase hemoglobin. Lime contains high levels of vitamin C, vitamin C helps iron absorption by up to 30%. The purpose of the study was to determine the effect of providing lime juice assistance along with Fe tablets to increasing hemoglobin levels in pregnant women with anemia in the third trimester. **Method:** The study design was a pre-post control group design. The population in this study were all 36 pregnant women with anemia in the third trimester at the Soko Community Health Center, using random sampling technique. The sample size is 32 respondents divided into two group. The treatment group given Fe tablets and lime for 14 days, and statistical analysis using Wilcoxon test. **Result:** The results of the study using SPSS for windows with a significance level of $\alpha = 0.005$ obtained a value of $p = 0.04$ which was proven to be $0.031 < 0.05$, so H1 is accepted meaning there is an influence. **Conclusion :** There is an effect of providing lime juice accompaniment along with Fe tablets on increasing hemoglobin levels in pregnant women with anemia in the third trimester. For future researchers, this research can continue to be developed to create a product of economic value that can be utilized by the community

keyword : lime, pregnancy, anemia

INTRODUCTION

Pregnancy causes changes in physiological and metabolic functions, which are highly susceptible to various stresses. Energy and oxygen requirements will increase in pregnancy (Mandasari et al., 2020). During pregnancy the body will experience significant changes, the body needs up to 30% more blood than before pregnancy, thus requiring an increased supply of iron and vitamins to make hemoglobin. During pregnancy, the mother's body will make more blood to share

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with her baby. Anemia in pregnancy cannot be separated from the physiological changes that occur during pregnancy, the age of the fetus, the condition of the previous pregnant woman (Noversiti, 2012).

The Riskesdas (2018) results stated that in Indonesia 48.9% of pregnant women experienced anemia. As many as 84.6% of anemia in pregnant women occurs in the 15-24 year age group. To prevent anemia, every pregnant woman is expected to get a minimum of 90 tablets of iron supplements during pregnancy (Indonesian Ministry of Health, 2021).

Based on data from the Indonesia Health Profile report (2021), administration of Fe-3 in Indonesia in 2018 was 81.16%, 64.0% in 2019, 83.6% in 2020, 84.2% in 2021, there was an increase even though has not met the target of 98%. The provision of Fe-3 in East Java Province in 2018 was 90.8%, the achievement in 2019 was 95%, in 2020 it was 88.9% which experienced a decrease, in 2021 it was 91.3% which experienced an increase even though it had not yet reached the target of 98%.

Based on data from the East Java Health Profile report, (2020), the provision of Fe-3 in Tuban Regency in 2019 was 93.0%, the achievement in 2020 was 93.3%, the achievement in 2021 was 91.6%, there was an increase even though it had not met target of 98%.

According to the initial survey in November 2022 at the Soko Community Health Center, Tuban Regency. Of the 8 third trimester pregnant women who had ANC, 3 pregnant women (37.5%) had mild anemia, 2 pregnant women (25%) had moderate anemia ad 3 pregnant women (37.5%) were not anemic.

Anemia during pregnancy can cause several negative effects on the mother and child such as fatigue, impaired immune function, work capacity and an increased risk of heart disease. In addition, anemia of pregnancy will increase the risk of premature birth and LBW which are the main causes of death in neonates (Stephen et al., 2018).

Problems caused by anemia in pregnancy range from mild complaints to severe complications such as bleeding, LBW (low birth weight) and abortion, depending on the severity of anemia and the duration of anemia. In addition, anemia can also have an impact on the long labor process due to inadequate

uterine contractions, during lactation there is a disturbance in the amount of milk production (breast milk). Nutritional factors are one of the factors that influence pregnancy, childbirth and postpartum (Prawirohadjo, 2014).

Efforts made to overcome and prevent anemia include administering Fe tablets and treating the causes. In addition, consuming foods with iron content and changing dietary habits by consuming fruit and vegetable foods (Mahardika & Zuraida, 2016). Non-pharmacological treatment can use vegetables and fruits that are simple and easy to get, one of the fruits that can increase hemoglobin levels in pregnant women is lime.

Research conducted by Putrianti in 2020 stated that there was a significant difference in HB levels between the group given lemon and the group given lime. Lime contains high levels of vitamin C, vitamin C helps iron absorption by up to 30%. When the need for iron is large, vitamin C is needed to help the absorption of iron by reducing ferric to ferrous which is easily absorbed 3-6 times (Almatsier, 2013). For those of us who live in Indonesia, especially in the Tuban area, limes are easy to find and the price is very affordable. Lime is a nutritious fruit choice, the nutritional content of lime is very good for the body.

Seeing this phenomenon, researchers concluded that treating anemia in pregnancy is not enough by giving iron tablets alone. Cooperation is needed between the government, health workers and the community to maximize the iron administration program. Besides that, the role of the family is also very important in supervising pregnant women in their families in consuming iron tablets (Nugraha et al., 2020).

Based on the description above, a study was conducted on "the effect of giving lime assistance along with Fe tablets on increasing hemoglobin levels in pregnant women with anemia in the third trimester".

METHOD

The study design was a pre-post control group design. The population in this study were all pregnant women with anemia in the third trimester at the Soko Community Health Center, as 36 pregnant women with anemia. The sample size is 32 respondents divided into control group and treatment group. Inclusion criteria

for case group are pregnant women 20-35 years in third trimester (28-36 week) with Hb level < 11 gr/ dl, willing to be respondents and don't has digestive tract disease. The control group was given Fe tablets for 14 days, the treatment group was given Fe tablets and 100 grams of lime taken from it and dissolved in 200 cc of hot water then drunk at night for 14 days. After 14 days, Hb was checked using GCHB easy touch.

Analysis in this research used computer tools with the SPSS for Windows program consisting of univariate analysis and bivariate analysis. Univariate analysis was carried out by creating a frequency distribution of each variable and respondent characteristics. Bivariate analysis was carried out to test the influence between two variables, namely each independent variable and the dependent variable. The statistical test used is the Wilcoxon test by calculating the OR. The confidence level was determined at $p=0.05$ with a CI of 95%. Ethical legal accept by Institut Ilmu Kesehatan Nahdlatul Ulama Tuban

RESULT AND DISCUSSION

The results of this research are described in the following table.

Table 1 Hemoglobin Levels of Third Trimester Pregnant Women with Anemia Before and After in Control Group

Hemoglobin Level	<i>Pre test</i>	Presentase (%)	<i>Post test</i>	Presentase (%)
Normal	0	0	2	12,5
Mild Anemia	6	37,5	8	50
Moderate Anemia	9	56,3	6	37,5
Severe Anemia	1	6,3	0	0
Total	16	100	16	100

Source: Primary data 2023

The majority of hemoglobin levels in pregnant women with anemia in the third trimester before being given Fe tablets experienced moderate anemia as many as 9 respondents (56.3%) and after being given Fe tablets for 14 days increased to mild anemia as many as 8 respondents (50%).

Anemia is a condition of decreased hemoglobin, hematocrit and red blood cell counts below the normal value set for individuals (Arisman in Jukarnain, 2013). Iron is a mineral needed to form red blood cells. Apart from that, this

mineral also functions as a component to form myoglobin (a protein that carries oxygen to muscles). Lack of iron in the daily diet can cause iron deficiency (Rizki et al., 2017).

The haematological changes associated with pregnancy are due to circulatory changes that increase to the placenta from the growing breasts. Plasma volume increases 45-65% starting in the second trimester of pregnancy, and the maximum occurs at the 9th month and increases by about 1000 ml, decreases slightly before term and returns to normal 3 months after parturition. Stimuli that increase plasma volume such as placental lactogen, which causes increased aldosterone secretion.

Iron deficiency anemia occurs in around 62.3% of pregnancies and is the most common anemia found in pregnancy. This is caused by a lack of entry of iron and food, due to impaired absorption, impaired use or because too much iron is excreted from the body, for example in bleeding. Iron requirements increase in pregnancy, especially in the last trimester. Iron requirements for non-pregnant women are 12 mg, pregnant women 17 mg and breastfeeding women 17 mg (Madiun in Jukarnain, 2013). Wintrobe suggested that the clinical manifestations of iron deficiency anemia varied widely, there could be almost no symptoms, there could also be prominent symptoms of the underlying disease, or symptoms of anemia could be found together with the symptoms of the underlying disease. Symptoms can include headaches, palpitations, lightheadedness, changes in nail epithelial tissue, disturbances of the neuromuscular system, lethargy, weakness, fatigue, dysphagia and enlarged spleen glands. It is generally agreed that if the hemoglobin level is < 7 gr/dl then the symptoms of anemia will be clear (Suheimi, 2007).

Factors of age, diet, disease can affect hemoglobin levels in the third trimester of pregnant women. The lack of information and mental readiness in the pregnancy process that pregnant women will face triggers hemoglobin levels which are influenced by fear, worry about complications, and even other possibilities that could occur. Therefore, midwives must provide education or information about the importance of consuming blood supplement tablets so that



possible effects of anemia do not occur or use digital technology such as cellphones to find out information other than that provided by the midwife.

Table 2 Hemoglobin Levels of Third Trimester Pregnant Women with Anemia Before and After in Treatment Group

Hemoglobin Level	<i>Pre test</i>	Presentase (%)	<i>Post test</i>	Presentase (%)
Normal	0	0	7	43,8
Mild Anemia	5	31,3	5	31,3
Moderate Anemia	9	56,3	4	25
Severe Anemia	2	12,5	0	0
Total	16	100	16	100

Source: Primary data 2023

The majority of hemoglobin levels in pregnant women with anemia in the third trimester before being given assistance with lime drink along with Fe tablets experienced moderate anemia as many as 9 respondents (56.3%) and after being given assistance with lime drink along with Fe tablets for 14 days increased to normal as many as 7 respondents (43.8%).

In line with research by Guntur, et al (2014) regarding Vitamin C as the dominant factor in increasing Hemoglobin (Hb) levels in pregnant women in South Kalimantan, which states that giving vitamin C has been proven to help the absorption of iron in pregnant women, but if vitamin C does not consumed regularly does not have a significant impact. The increase in Hb levels in anemic pregnant women who were not given treatment by consuming Fe tablets using lime juice, it can be seen that the increase in Hb levels for the control group relatively did not experience an increase in Hb levels. Almost half did not experience an increase, namely 7 people (35%), while there was only 1 person (5%) who experienced an increase in Hb levels, with general data aged 20-35 years, having children during pregnancy was <20 years, and after Food recall was carried out with vitamin C deficiency.

This is in accordance with Asiyah (2014) that the increase in hemoglobin levels in pregnant women who only consume Fe tablets is an average of 0.2 mg/dL which does not make a significant difference. It was explained by the Indonesian Ministry of Health (2018) that pregnant women need around 800 mg of iron, food produces 8-10 mg of Fe so they must consume at least 60 blood

supplement tablets during pregnancy and must consume vitamin C which helps the process of absorbing iron in the body. In line with Sianturi (2015), iron with vitamin C forms a complex iron ascorbate which is soluble and easily absorbed by organs in the human body. The conversion of non-heme iron in the form of the inorganic compound Ferric (Fe^{3+}) to Ferro (Fe^{2+}) will be greater if the pH in the stomach becomes more acidic. Vitamin C can increase the acidity of the stomach's pH so that it can help the absorption of iron in the stomach. Vitamin C can increase iron absorption by as much as 30%.

Pregnancy is the period when a woman carries an embryo or fetus in her body. The pregnancy period from ovulation to parturition is approximately 280 days (40 weeks) and cannot be more than 300 days (43 weeks) (Kuswanti, 2014). There are changes in the body's systems in an effort to adapt to pregnancy, including the blood circulation system (Cardiovascular). Rapid blood thinning (hemodilution) occurs in the second trimester of pregnancy and begins to decrease in the third trimester, resulting in pregnant women entering the third trimester who are still susceptible to experiencing anemia, especially iron deficiency anemia. Therefore, additional iron is needed in the form of supplements to help the mother's daily iron intake. Vitamin C can increase iron absorption by as much as 30%.

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The large number of pregnant women who receive blood supplement tablets but there are still pregnant women who suffer from anemia even though they have been given blood supplement tablets, this is due to several factors, one



of which is the latest educational factor of pregnant women at the Soko Community Health Center, Tuban Regency, almost half of whom have junior high school education so it is a little difficult for mothers to catch education provided by midwives or health workers about how to consume blood supplement tablets.

Anemia is a condition where the hemoglobin level is low due to pathological conditions. Fe deficiency is one of the causes of anemia but not the only cause of anemia. Iron deficiency anemia is anemia that occurs due to a lack of iron in the blood. The treatment is for pregnant, non-pregnant and lactating women who require iron intake and are recommended to be given iron tablets. To confirm the diagnosis of iron deficiency anemia, anamnesis is carried out. Iron requirements for pregnant women are on average close to 800 mg.

Consuming vitamin C has been proven to help increase Hb levels. The increase will be more optimal if accompanied by consumption of non-heme food sources. Vitamin C consumption does not depend on the amount but rather on the regularity of consumption. Regular consumption of vitamin C showed a significant relationship ($p=0.000$). Calculating the linear regression of consuming vitamin C once can increase Hb levels by 0.06 g/dL. This means that if individuals frequently consume vitamin C, Hb levels will also increase (Guntur, 2014).

Many pregnant women get Fe tablets but there are still pregnant women who suffer from anemia even though they have been given Fe tablets, this is due to several factors, including mothers who do not understand how to take Fe tablets. Fe tablets should be consumed after eating and drinking, Fe tablets are not recommended together with taking supplements containing calcium or high-calcium milk, coffee, and tea because iron absorption will be disrupted because they can bind Fe, thereby reducing the amount of absorption. Consuming iron can cause constipation and change the color of the stool to dark. Recommend consuming iron followed by vegetables to increase iron absorption. Iron administration should not last longer than 6 months if done without a doctor's supervision.

Based on these factors, researchers are of the opinion that what pregnant women should do to prevent anemia during pregnancy is to increase awareness

about consuming nutritious food, taking Fe tablets regularly, seeking information (sharing) with family, experienced friends or consulting with health workers

Table 3 Cross Tabulation of The Effect of Providing Lime Along With Fe Tablets On Increasing Hemoglobin Levels In Third Trimester Pregnant Women with Anemia

Hemoglobin levels	<i>Control Group</i>		<i>Treatment Group</i>	
	n	%	n	%
Normal	2	12,5	7	43,8
Mild anaemia	8	50	5	31,3
Moderate anemia	6	37,5	4	25
Severe anemia	0	0	0	0
Total	16	100	16	100

Uji Wilcoxon ranks test $\alpha=5\%$ $\rho=0,04$

Source: Primary data 2023

Based on the results of statistical test analysis on hemoglobin levels in pregnant women with anemia in the third trimester before and after being given assistance with lime wedang along with Fe tablets, the respondents showed that there was a significant difference between before and after receiving treatment using the Wilcoxon ranks test, obtained $p = 0.04 < \alpha (0.05)$. This means that there is an influence of providing assistance with lime wedang along with Fe tablets on increasing hemoglobin levels in third trimester anemic pregnant women at the Soko Community Health Center, Tuban Regency. Half of the hemoglobin levels in the control group of third trimester anemic pregnant women after being given Fe tablets experienced mild anemia as many as 8 (50%) and half of the hemoglobin levels in the intervention group after being given lime wedang along with Fe tablets experienced an increase to normal as many as 7 respondents (43, 8%). This means that accompanying lime wedang along with Fe tablets is effective in increasing the hemoglobin levels of pregnant women with anemia in the third trimester.

In line with Siti Asiyah, Dwi Estuning Rahayu (2014) research, the results of the Mann-Whitney test proved that the increase in Hb levels in anemic pregnant women who consumed Fe tablets using lime juice was faster than in anemic pregnant women who consumed Fe tablets without using lime juice. The



mean rank obtained by the treatment group (14.60) was greater than the mean rank obtained by the control group (6.40), the sum of rank obtained by the treatment group (146.0) was also much greater than the control group (64.00). This explicitly shows that consuming Fe tablets using lime juice has a positive effect in accelerating the increase in Hb levels in anemic pregnant women.

Increased Hb levels in Anemic Pregnant Women who drank Fe with lime in the Bendo Community Health Center Working Area, Pare District, Kediri Regency on the 21st day, increased Hb levels in anemic pregnant women after being given intervention in the form of consuming Fe tablets using lime juice as much as 10% (20ml) mixed with 90% sugar solution (12.5 gr) (180ml), with a total solution of 200 ml, which was given once a day for 7 days, in the category of increasing Hb levels, namely 7 respondents or 35% of the total respondents in the treatment group. Disorders that commonly occur during pregnancy, especially anemia, can be prevented by consuming foods with balanced nutrition and sufficient vitamin C. In this case, vitamin C functions for the absorption of non-heme iron, which converts ferric (Fe^{3+}) to ferrous (Fe^{2+}).

According to Fitria Krisnawati (2015) the number of pregnancies, number of children, level of education and compliance with consuming fe are factors in anemia in pregnancy. Having more than 3 children and being over 35 years of age affects the functions of the body's organs and also the body's metabolism, so it can affect the absorption of nutrients, including iron. According to Manuaba's opinion (2010), pregnancy requires additional iron and balanced nutrition for the formation of blood cells to supply the fetus and placenta. If the mother often gives birth, she will experience a lot of blood loss. So the more often you give birth, the more anemia. This is in line with anemia pregnant women at the Soko Health Center, Tuban Regency, with the last parity being mostly multiparity.

Anemia can be caused by malabsorption (impaired digestion of food) of iron which can result in the iron from blood supplement tablets not being able to be absorbed optimally. This is in accordance with Syaza Azra, Rajuddin Rajuddin, (2022) that 76.9% of pregnant women who consume iron inhibitor foods experience anemia. To improve this, it is highly recommended to consume vitamin C which will help the absorption of iron so that anemia can be reduced or

overcome. Food sources of iron should be consumed at the same time as foods that increase absorption, for example fruit that contains a lot of vitamin C, whereas foods that inhibit iron absorption should not be consumed at the same time (Yusnaini, 2014).

Researchers are of the opinion that increasing hemoglobin levels can be helped by the obedience of pregnant women in consuming blood supplement tablets (Fe) and vitamin C during pregnancy, at least 90 tablets, based on knowledge, motivation and family support. In addition, counseling in the form of leaflets regarding the benefits and how to use iron tablets and vitamin C is good and right. Furthermore, pregnant women are educated about foods that can inhibit blood absorption, such as phytates (nuts, seeds), vegetable protein in soybeans, other legumes, calcium in milk, polyphenols such as tannic acid in tea, coffee, grain products, oregano and red wine.

CONCLUSION

There is an effect of providing lime wedang along with Fe tablets which is effective in increasing the hemoglobin levels of pregnant women with anemia in the third trimester.

SUGGESTION

For future researchers, research can continue to be developed to create a product of economic value that can be utilized by the community.

For the profession, researchers suggest providing more education to the public, especially pregnant women, about lime juice along with Fe tablets for anemia so that the public or pregnant women understand and are aware of their own health. Of course, providing education with attention to mother's education and other factors that can affect communication.

It is hoped that the results of this research can be used as input for learning references in the Pregnancy Care course on the topic of anemia in pregnant women.

Efforts are needed to increase self-care regarding pregnancy health in order to prevent complications and support from husbands and other family



members as well as neighbors or friends is needed in the form of informational, instrumental, emotional and assessment (appreciation) support.

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