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RESEARCH ARTICLE

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The Influence of Giving Fe Tablets along with Guava Juice on The Increasing of Hb Levels in Pregnant Women in South Tangerang Region Health Center

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ABSTRACT

Giving iron tablets (Fe) is one of the efforts to prevent anemia. Guava is a fruit that rich in vitamin C that can increase the absorption of Fe in the body. The purpose of this study is to analyze the influence of giving Fe tablets along with guava juice on the increasing of Hb levels in pregnant women in South Tangerang Region Health Center. This study used quasi experimental two group pre-post design. The sample consisted of 30 third trimester pregnant women with anemia which were divided into two treatment and control groups. The sampling technique used purposive sampling. Data analysis using Independent T-test, correlation and linear regression analysis. The results showed there was a significant difference between the increase in Hb levels resulting from the giving of Fe tablets along with guava juice compared with only the giving of Fe tablets with a p-value of 0.000. Multivariate analysis between treatment and control groups obtained p-value = 0.00, with the coefficient of determination (R square) = 0.748. The conclusion is giving Fe tablets along with guava juice has influence on the increasing of Hb levels in pregnant women, so it is recommended for anemic pregnant women to take Fe tablets along with guava juice

Keywords: haemoglobin; anemia, Fe tablets; guava juice

INTRODUCTION

Anemia in pregnancy is a global problem faced by the world today, especially in developing countries. The World Health Organization (WHO) estimates that 42% of pregnant women with anemia occur worldwide.⁽¹⁻²⁾ In Asia, anemia is the second leading cause of maternal death and accounts for 12.8% of maternal deaths due to postpartum hemorrhage.⁽²⁻³⁾ The incidence of anemia in tropical countries is between 40-80%. In Indonesia, a tropical country, anemia is still an important health problem and has a significant impact on maternal mortality. The prevalence of anemia based on the survey is between 50-70%.^(2,4) Based on the Basic Health Research (RISKESDAS) in 2018, there were 48.9% of pregnant women with anemia, an increase from the results of 2013 research was 37.1%^(5,6).

During pregnancy there is a disproportionate increase in plasma volume reaching 50%, red blood cells reaching 33% and mass Hb 18-20%. Blood thinning in pregnancy is a physiological thing that starts around eight weeks and continues until 32 weeks of the 34th pregnancy. It is this blood dilution that causes women to become anemic. Anemia is diagnosed by estimating hemoglobin concentrations and checking peripheral blood smear to see the characteristic changes in red blood cells.⁽⁷⁾

WHO defines anemia as a condition of hemoglobin (Hb) level in the blood of less than 11 g / dl.⁽⁸⁾ Anemia in pregnancy occurs when the functioning of red blood cells in the body of a pregnant woman results in decreased oxygen function so that there is a risk of complications in pregnancy. Some complications in pregnant women that can be caused by anemia include infection, premature birth, postpartum hemorrhage and shock.^(4,7,9-10) The big impact of anemia is not only on the mother but also on mortality / morbidity and the incidence of low birth weight (LBW) which in turn can contribute to the increase in infant mortality.^(1, 11-12)

The most common cause of anemia in pregnancy is iron deficiency⁽⁷⁾. Iron deficiency in pregnancy can increase perinatal risk for mothers and newborns and in general can increase infant mortality⁽⁸⁾. The efforts to prevent and overcome anemia nationally have been carried out by the government, one of which is by increasing the coverage of Fe tablet supplementation. Other efforts that can be done by paying attention to the consumption patterns of pregnant women who must still refer to the healthy and balanced eating patterns contained in the general message of balanced nutrition. Eating managements for pregnant women are not in quantity or numbers but in the quality or composition of nutrients, because this factor is more influenceive and functional for the health of the mother and fetus. For example to increase consumption of foods high in iron such as milk, meat, and green vegetables or fruit⁽¹³⁾.

The status of iron in the human body depends on the absorption of iron, and iron absorption is greatly influenced by the availability of vitamin C in the body. One enhancer that can increase iron absorption is a source of vitamin C such as oranges, guava, papaya, and others. Vitamin C helps reduce ferric iron (Fe^{3+}) to ferrous (Fe^{2+}) in the small intestine so that it is easily absorbed, the reduction process will be even greater if the pH in the stomach is more acidic. Vitamin C can increase acidity so that it can increase iron absorption by up to 30%⁽¹⁴⁾. One of the fruits that contain high vitamin C is guava fruit. The content of vitamin C in 100 g of guava is 80.1 mg⁽¹⁵⁾. The aim of this study is to analyze the influence of giving Fe tablets along with guava juice on increasing Hb levels of pregnant women in the South Tangerang Region Health Center.

METHODS

This study used quasi experimental two group pre-post design. The population was all third trimester pregnant women who were anemic and consumed Fe tablets in the South Tangerang region. Samples were 30 people with purposive sampling technique. The sample was divided into two groups, a treatment group of 15 people who were given interventions in the form of Fe tablets and guava juice, and the control group were only given Fe tablets. Inclusion criteria were: third trimester pregnant women who were anemic (Hb <11g / dl), pregnant women who were willing to be respondents. Exclusion criteria were: pregnant women with a history of chronic anemia, pregnant women who did not consume Fe tablets and guava juice regularly. The technique of data collection is done by measuring Hb before and after treatment with the Hemoglobin Testing System Quick-Check method. Giving 90 Fe tablets and 100 gram guava juice per day distributed to the treatment group for 21 days. Data analysis using Independent T-test, correlation and linear regression analysis.

RESULTS

Descriptive Analysis

Table 1. Distribution of respondent characteristics

Characteristics	Groups			
	Intervention		Control	
	n	%	n	%
Parity				
-Primipara	4	26.7	4	26.7
-Multipara	11	73.3	11	73.3
Occupation				
-Not working	9	60	6	40
-Working	6	40	9	60

The characteristics of the respondent based on table 1 were 73.3% of the intervention and control groups were multipara, in the intervention group 60% did not work and in the control group 60% worked.

Table 2. Distribution of age, rest period and dietary habit

Variable	Intervention group		Control group	
	Mean \pm SD	Min-max	Mean \pm SD	Min-max
Age	28.20 \pm 6.338	18-38	27.27 \pm 5.6688	20-39
Rest period	3.13 \pm 1.302	1-5	2.74 \pm 1.120	1-4
Dietary habit	3.17 \pm 1.102	1-5	2.93 \pm 0.834	2-4

The average age of the intervention group was 28.20 years and the control group was 27.27 years, the average length of rest in the intervention group was 3.13 hours, and the control group was 2.74 hours and the frequency of eating in the intervention group was 3.17 times and the control group was 2.93 times.

Bivariate Analysis

Table 3. Differences in Hb levels before and after treatment

Variable	n	Mean	SD	SE	p-value	95% CI
Intervention Group						
Hb before	15	9.673	0.8371	0.2161	0.000	1.5376 to 2.3557
Hb after	15	11.620	0.6073	0.1568		
Differences						
		1.947	-0.2298			
Control group						
Hb before	15	9.560	0.7199	0.1859	0.255	-0.698 to 0.2431
Hb after	15	9.647	0.6937	0.1791		
Differences						
		0.087	-0.0262			

Based on the results of the study obtained the average Hb level before and after treatment in the intervention group increased by 1.947 points with a p-value of 0.000, this shows that there was an influence of giving Fe tablets with guava juice on the increase in Hb Levels. In the control group there was an increase in Hb of 0.087 points with a p-value of 0.255.

Table 4. Comparison of increased Hb levels between intervention and control groups after treatment

Variable	n	Mean	SD	SE	p-value	95%CI
Hb Level intervention group	15	1.947	0.7386	0.1907	0.000	-2.2889 to -1.4311
Hb Level control group	15	0.087	0.2825	.0729		

Based on the results of the study obtained the average Hb levels after treatment in the intervention group and the control group increased by 1.86 points with a p-value of 0.000 <0.05 meaning that there was a significant difference between the increase in Hb levels resulting from the giving of Fe tablets and guava juice compared with only giving Fe tablets .

Multivariate Analysis

Before conducting a multivariate analysis, selection was conducted to the variables which in the bivariate analysis the Independent T-Test and the correlation coefficient test were carried out first. Variables included in multivariate modeling with p-value <0.25. The bivariate selection results can be seen in the table 5.

Table 5. Bivariate variable selection that passed multivariate modeling

Variable	p-value
Consumption of Fe / Guava	0.000
Mother's age	0.748
Parity	0.922
Occupation	0.229
Resting time	0.308
Food consumption	0.396

The expected variable as confounding between consumption of Fe / guava juice on the increase in Hb was the mother's occupation. In this modeling, it is identified which variables had p-values <0.05. Then did the selection by removing the research variables one by one from the model, the variables that had p-value >0.05.

Table 6. Multivariate final modeling the influence of mother's characteristics to Hb level

Variabel	Beta	R Square	p-value	95% CI
Constant	0.087	0.748	0.000	1.442-2.278
Fe+ Guava juice	1.860			

Based on the table 6, it can be seen that the coefficient of determination (R square) of 0.748, meaning that the intervention group could explain the increase in Hb levels by 74.8%. The p-value = 0.000 means that there was an influence of giving Fe tablets and guava juice to the average increase in Hb levels of pregnant women.

Linear Regression Equation

The increase in Hb = 0.087 + 1.860 (the giving of Fe tablets and guava juice). In the intervention group, it had mean increase in Hb levels of 1.860 g% compared to the control group.

DISCUSSION

Based on the results of the study, the average increase in Hb levels before and after the intervention group increased by 1.947 points with a p-value of 0.000. In the control group the mean increase in Hb levels before and after increased by 0.087 points with a p-value of 0.255. This means that there are significant differences between the mean increases in Hb levels before and after the respondent as a whole. The benefits of guava juice for increasing Hb levels have been widely proven in previous studies. Research in Malang proved the same thing that guava juice can increase Hb levels in pregnant women⁽¹⁵⁾.

The giving of Fe tablets along with guava juice can increase the Hb levels of anemic mothers because iron absorption is strongly influenced by the availability of vitamin C in the body. Guava extract contains Vitamin C which is absorbed by the small intestine through active transport by diffusion. Vitamin C, which forms complex iron, is soluble and easily absorbed by organs in the human body. Conversion of iron in the form of Ferri (Fe^{3+}) inorganic compounds to Ferro (Fe^{2+}) will be even greater if the pH in the stomach is more acidic. Vitamin C can increase acidity so that it can increase iron absorption by up to 30%^(14,19).

The results showed that one guava (*psidium guajava*) contained sixteen types of carotenoids in the part of guava meat and thirteen were found as carotenoids that function for antioxidant activity⁽¹⁶⁾. The levels of vitamin C in 100 g of guava is 80.1 mg, five times more than other vitamin C^(17,20). The chemicals in guava are amino acids (tryptophan, lysine), calcium, phosphorus, iron, sulfur, vitamin A, vitamin B1, and vitamin C. Guava is also a rich source of dietary fiber, folic acid and various food minerals such as potassium, copper and manganese. Guava leaf extract is useful for antibacterial activity because it contains flavonoid glycosides, Morin-3-O-alpha-L-lyxopyranoside and morin-3-O-alpha-L-arabopyrano side. One guava fruit was found around sixteen types of carotenoids in the part of guava meat and thirteen were found as carotenoids that function for antioxidant activity⁽¹⁸⁾.

There were differences in the mean Hb levels in the intervention group because the high vitamin C content in guava can be utilized by pregnant women in the formation of red blood cells, because during pregnancy, the concentration of vitamin C in the blood falls as a result of hemodilution of red blood cells. Iron is one of the nutrients that cannot be obtained from food with large amounts, besides that iron is a substance that is difficult to be absorbed by the body so it needs vitamin C so that iron can be absorbed optimally⁽²¹⁾.

One of government programs to overcome the problem of pregnant women with anemia is by giving 90 Fe tablets during pregnancy⁽²²⁾. The program is approaching the national target and compliance of pregnant women in consuming Fe tablets is good but both of these have not been influenceive in reducing the prevalence of pregnant women with low Hb levels⁽²³⁾. Anemia prevention programs for pregnant women (low Hb levels) are very varied, it is not only enough to supply and distribute supplementation of Fe tablets, but must be accompanied by providing specific information to the public such as education about food or other supplements that can help the absorption of Fe tablets quickly and maximum⁽²²⁾.

Yani Ahmad, et al (2017) research found that age, parity, education, occupation, information sources influence the actions of mothers taking Fe tablets, but in this study factors such as age, parity, occupation, rest periods and food consumption patterns did not affect on the increase in Hb in the intervention group⁽²⁴⁾. Compliance with consuming Fe tablets affects the increase in Hb of pregnant women. Pregnant women who obediently drink Fe tablets will increase their Hb levels by 3.24 times compared to non-adherents, and counseling in the form of leaflets, SMS reminder can increase compliance with iron tablet taking. In addition to compliance with Fe tablets, the increase in Hb of pregnant women is also influenced by consumption of high protein foods, pregnant women with anemia who consume protein-containing foods every day, their Hb levels increase by 2.31 times compared to mothers who do not consume foods containing protein⁽²⁴⁻²⁵⁾. The pattern of food consumption in this study did not significantly influence Hb increase, this could be due to what was measured in this study was the consumption pattern of how many times a day the respondent ate, not on the type and amount of nutrition consumed by the respondent.

CONCLUSION

The conclusion of this study are:

- 1) There is a difference in the Hb levels of pregnant women before and after the giving of guava juice with Fe tablets.
- 2) There is an influence of giving Fe tablets along with guava juice to the average increase in Hb levels of pregnant women.
- 3) The giving Fe tablets along with guava juice in pregnant women can increase the average Hb level.

For the next studies, it is better not only to examine hemoglobin levels, but also to examine hematocrit levels, ferritin serum levels, and average erythrocyte volume (MCV), so that the influence of guava juice on several blood components that play a role in anemia can be known

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