

# The Effect of the Combination of Giving Juice Which is a Source of Vitamin C and Iron to Increase Hemoglobin Levels in Anemic Pregnant Women Who Get Supplementation of Fe Tablets at the Sikumana Health Center Kupang

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## ABSTRACT

**Introduction:** One of the problems often experienced by pregnant women is anemia. Anemia in pregnancy is a condition of pregnant women with hemoglobin levels below 11 g/dl. Iron is a mineral needed to form red blood cells (hemoglobin). Another effort to increase hemoglobin levels in the body is to increase the consumption of nutritious foods, namely foods that contain lots of iron and vitamin C from animal and vegetable foods which are very useful for increasing the absorption of iron and vitamin C in the intestine. This study aims to determine the effectiveness of the combination of juice which is a source of iron and vitamin C to increase hemoglobin levels in anemic pregnant women who receive iron supplementation at the Sikumana Health Center Kupang.

**Material and methods:** This type of research used in this study is quasi experimental design research. The main feature of Quasi Experimental Design is the development of True Experimental Design, which has a control group but is unable to control external variables that affect the conduct of the experiment. The design used in this study is a quasi-experiment with a pretest-posttest-control group design approach. This research was done by doing a pre-treatment test. A post-test is carried out after treatment. This is done to see if hemoglobin levels change before and after treatment. The researchers used Quasi Experimental Design because there were external variables in this study that the researcher could not control. The study was conducted at the Sikumana Community Health Center in Kupang City with a sample size of 76 respondents. Data analysis used the Anova test and Duncan's advanced test.

**Conclusion:** The results showed that there was an effect of giving Fe tablets and the combination of red spinach juice, green bean juice, and tomato juice on increasing hemoglobin levels of anemic pregnant women. In the control group, the mean hemoglobin level before treatment was 7.8 g/dl and after treatment was 9.6 g/dl. In the Fe tablet and red spinach juice group the mean hemoglobin level before treatment was 7.5 g/dl and after treatment was 11. g/dl. In the Fe tablet and green bean juice group the mean hemoglobin level before treatment was 8.1 gr/dl and after treatment was 11 g/dl. In the Fe tablet and tomato juice group the mean hemoglobin level before treatment was 8.6 g/dl and after being treated was 10.8 g/dl. Then a follow-up test was carried out and there were differences in all groups based on the mean / average of each group. It can be concluded that the administration of red spinach juice and Fe tablets is the fastest and most effective way to increase hemoglobin levels in pregnant women with anemia.

**Keywords:** Hemoglobin, Red Spinach Juice, Tomato Juice, Anemia

## INTRODUCTION

One of the problems that is often experienced by pregnant women is anemia. Anemia in pregnancy is a condition of pregnant women with hemoglobin levels below 11 g/dl.<sup>1</sup> Anemia in pregnant women is bad for both mother and fetus. Possible adverse effects on pregnant women are labor which takes a long time and results in bleeding and shock due to contractions. Adverse effects on the fetus, namely prematurity, low birth weight babies, disabilities, and even infant mortality.<sup>2</sup>

Globally, the prevalence of anemia in pregnant women worldwide is 41.8%. The prevalence of anemia in pregnant women is estimated at 48.2% in Asia, 57.1% in Africa, 24.1% in America, and 25.1% in Europe. In poor countries, about 25-50% of the deaths of women of childbearing age are caused by problems related to pregnancy, childbirth, and postpartum. WHO estimates that worldwide each year more than 585,000 die during pregnancy or childbirth.<sup>3</sup>

Blood-boosting tablet supplementation is always done for the treatment and prevention of anemia. Although the government has implemented an anemia control program for pregnant women, namely by giving 90 Fe tablets to pregnant women during the pregnancy period with the aim of reducing the anemia rate of pregnant women, the incidence of anemia is still high.<sup>4</sup> This is due to the non-compliance of pregnant women in consuming iron tablets due to several side effects such as nausea, vomiting, constipation, and heartburn. Other efforts to increase hemoglobin levels in the body include

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increasing the consumption of nutritious foods, namely foods that contain lots of iron from animal foods (meat, fish, chicken, liver, eggs) and vegetable food ingredients (dark green vegetables, nuts such as green beans, tempeh). Eating fruits that contain lots of vitamin C (tomatoes, oranges, pineapple, watermelon) is very useful for increasing iron absorption in the intestine.<sup>5</sup>

Kupang Health Office Profile data shows that pregnant women with anemia incidence at the Sikumana Health Center from 2016 to 2018 have increased, starting from 2016 pregnant women with anemia incidence of 9.0%, in 2017 it was 19.2%, and in 2018 amounted to 38.1%. The results of a preliminary study conducted at the Sikumana Health Center from June to December 2019 showed that pregnant women with anemia had increased every month with a total of 429 pregnant women.<sup>6</sup> Based on the above background, the authors are interested in conducting research on "The Effectiveness of the Combination of Juice Giving Which Is a Source of Iron and Vitamin C to Increase Hemoglobin Levels in Anemic Pregnant Women Who Receive Fe Tablet Supplementation at Sikumana Public Health Center".

#### Research Methods

This study uses a quantitative approach. The design used in this study is a quasi-experiment with a pretest-posttest-control group design approach. This research was done by doing a pre-treatment test. A post-test is carried out after treatment. This is done to see if hemoglobin levels change before and after treatment.

This study used the Probability Sampling technique with the Simple Random Sampling method. Simple random sampling is a technique for obtaining samples that are performed directly in the sampling unit. Then each sample unit, as an element of a distant population, has the same opportunity to become a sample or to represent its population. This method is performed when members of the population are considered homogeneous. This technique can be used when the number of sample units in a population is not too large. The simple random sampling method can be performed by lottery, ordinal, or random number table methods.<sup>7</sup>

The sampling criteria in this study used inclusion and exclusion criteria. Inclusion criteria are criteria where

the research topic is a research sample that meets the requirements as a sample.<sup>8</sup> In this study the inclusion criteria were: pregnant women with Hb levels <11 g/dl, pregnant women aged 20 to 35 years, trimester I-II pregnant women and pregnant women willing to be interviewed.

The exclusion criteria are criteria for which the research topic cannot represent the sample because it does not meet the requirements as a research sample, e.g. For example, ethical barriers, refusal to be a respondent, or a situation where research cannot be done. The exclusion criteria in this study were: pregnant women with chronic bleeding, pregnant women with comorbidities (malaria, tuberculosis, worms) and uncooperative pregnant women and unwilling to be interviewed.

This research was conducted at the Sikumana Health Center, Kupang in September 2020. The study population was 326 pregnant women with anemia. The sample in this study were 76 pregnant women. The technique of collecting data is by filling out the pre and post observation sheets to the respondents. Data analysis used Anova test and Duncan's advanced test.

## RESULTS

### 3.1 Characteristics of Respondents

The characteristics of this study are described as follows:

Based on the table-1, it can be seen that the age of the respondents in each group is mostly less than 30 years old, namely in the Fe tablet and red spinach group as many as 15 respondents (78.9%), in the Fe tablet and tomato group as many as 16 respondents (84.2%) and in the control group as many as 14 respondents (73.7%),

### 3.2 Mean Hemoglobin Levels Between Treatments

Table 2: Mean Hemoglobin Levels Between Treatments Before and After Intervention at the Sikumana Health Center in 2020

Based on table -2, it showed that in the Fe tablet and red spinach juice group, the average hemoglobin level before treatment was 7,5 g/dl (SD ± 0,67), the maximum hemoglobin level was 8,8 g/dl, and the minimum hemoglobin level was 6,2 g/dl. In the Fe tablet and red spinach juice group, the mean hemoglobin level after being given the treatment was

Treatment	Age Group			
	≤30 years old		≥30 years old	
	n	%	N	%
Fe Tablet and Red Spinach Juice	15	78,9	4	21,1
Fe Tablet and Tomato Juice	16	84,2	3	15,8
Control	14	73,7	5	26,3

**Table-1:** Characteristics of Respondents by Age at the Sikumana Health Center in 2020

Treatment	Pre				Post			
	Min	Max	Mean	±SD	Min	Max	Mean	±SD
Fe Tablet and Red Spinach Juice	6,2	8,8	7,5	±0,67	10,2	13,5	11,8	±1,10
Fe Tablet and Tomato Juice	6,9	9,1	8,6	±0,80	10	11,4	10,8	±0,60
Control	6,2	9,9	7,8	±0,83	8,1	11,9	9,6	±0,86

**Table-2:** Mean Hemoglobin Levels Between Treatments Before and After Intervention at the Sikumana Health Center in 2020

Treatment	Hemoglobin Level	P Value
	Mean SD	
Fe Tablets and Red Spinach Juice	11,8 (±1,10)	0,00
Fe Tablet and Tomato Juice	10,8 (±0,60)	
Control	9,6 (±0,86)	

**Table-3:** Effect of Treatment on Hemoglobin Levels of Pregnant Women at the Sikumana Health Center in 2020

Group	Mean± Stdev
Fe Tablets and Red Spinach Juice	11,8895 ± 1,10448 <sup>c</sup>
Fe Tablet and Tomato Juice	10,8684 ± 0,60466 <sup>b</sup>
Control	9,6368 ± 0,86616 <sup>a</sup>

**Table-4:** Duncan Difference Test Results

11,8 g/dl (SD ± 1,10), the maximum hemoglobin level was 13,5 g/dl, and the minimum hemoglobin level was 10,2 g/dl. In the Fe tablet and tomato juice group the mean hemoglobin level before being given the treatment was 8,6 g/dl (SD ± 0,80), the maximum hemoglobin level was 9,9 g/dl, and the minimum hemoglobin level was 6,9 g/dl. In the Fe tablet and tomato juice group, the hemoglobin level after being given the treatment was 10,8 g/dl (SD ± 0,60), the maximum hemoglobin level was 11,9 g/dl, and the minimum hemoglobin level was 10 g/dl.

In the control group the average hemoglobin level before treatment was 7,8 g/dl (SD ± 0,83), the maximum hemoglobin level was 9,1 g/dl and the minimum hemoglobin level was 6,2 g/dl. In the control group, the mean hemoglobin level after being given the treatment was 9,6 g/dl (SD ± 0,86), the maximum hemoglobin level was 11,4 g/dl and the minimum hemoglobin level was 8,1 g/dl.

### 3.3. Effect of Treatment on Hemoglobin Levels After Intervention

Based on Table 3, it showed that there was an effect of giving red spinach, green bean, and tomato juice extracts on increasing hemoglobin levels in pregnant women at Sikumana Health Center Kupang, where the p value was <0.05. So, it can be concluded that there is an influence, then it is followed by Duncan's difference test.

### 3.4. Post Hoc Test

Based on Duncan's different test, it can be concluded that giving Fe tablets and red spinach juice is faster and more effective to increase hemoglobin levels in pregnant women with anemia at the Sikumana Health Center Kupang.

## DISCUSSION

Hemoglobin is the main protein in the human body which functions to transport oxygen from the lungs to the peripheral tissues and transport CO<sup>2</sup> from the peripheral tissues to the lungs. Hemoglobin is a widely used parameter to determine the prevalence of anemia. Hemoglobin synthesis is a biochemical process that involves several nutrients or intermediates. This synthesis process is related to the synthesis of heme and globin protein.<sup>9</sup>

A low hemoglobin content indicates anemia. Anemia is

a condition when the number of red blood cells or the concentration of oxygen carriers in the blood hemoglobin (Hb) is insufficient for the body's physiological needs.<sup>10</sup> Anemia during pregnancy can increase the risk of death during childbirth, give birth to babies with low birth weight, fetuses and mothers who are prone to infections, miscarriage, and increase the risk of premature birth.<sup>11</sup>

Red spinach juice and honey are considered to have a fairly high iron content. Red spinach juice and honey are increasingly beneficial because they contain abundant iron, folic acid, and vitamin C, making red spinach and honey help build red blood cells, prevent anemia, and increase hemoglobin levels. Red spinach juice and honey can affect the increase in hemoglobin levels of pregnant women who are anemic. Red spinach and honey contain folic acid, vitamin B1, potassium, vitamin A, vitamin C, calcium, and iron. The content contained in red spinach juice and honey is useful as an anti-anemia or can increase hemoglobin levels in the blood. Red spinach juice and honey are also more easily absorbed than meat or other ingredients and can be consumed 3 times a week for pregnant women and can have an effect on increasing hemoglobin levels of pregnant women.<sup>12</sup>

Red spinach juice and honey contain iron which helps in promoting blood oxygen circulation. Vitamins A and C both function as antioxidants that can protect the body and brain from toxins and populations. Vitamin C helps the absorption of iron for the immune system processes. Moreover, the presence of vitamin B12 and folic acid, both of which are an important combination for the formation of new cells, can affect iron in the blood and increase hemoglobin.<sup>13</sup>

The mechanism of consuming red spinach juice mixed with honey increases hemoglobin, namely red spinach and honey which contains iron which helps in improving blood oxygen circulation. The vitamins A and C both function as antioxidants that can protect the body and brain from toxins and populations. Vitamin C helps the absorption of iron for the immune system processes. Other than that, the presence of vitamin B12 and folic acid, which is an important combination for the formation of new cells, can affect iron in the blood and increase hemoglobin. Red spinach can be used well as an alternative to prevent and treat iron deficiency anemia.<sup>14</sup>

Iron absorption is influenced by many factors. Animal protein and vitamin C increase absorption. Coffee, tea, calcium, magnesium, and phytate salts can bind Fe thereby reducing the amount of absorption. Therefore, Fe tablets should be swallowed together with foods that can increase the amount of absorption, while foods that bind to Fe should be avoided, or not eaten at the same time. Besides, additional iron should be obtained from food, because Fe tablets are proven to increase zinc levels in serum.<sup>15</sup>

The results showed that in the Fe tablet and red spinach juice group the mean hemoglobin level after being given the treatment was 11,8 gr/dl, the maximum hemoglobin level was 13,5 gr/dl, and the minimum hemoglobin level was 10,2 gr/dl. It can be concluded that giving Fe tablets and red

spinach juice can increase hemoglobin levels in pregnant women with anemia.

This research is in line with research conducted by<sup>15</sup> which stated that there was a significant effect between the consumption of red spinach juice on an increase in hemoglobin levels in pregnant women who were anemic. Red spinach contains lots of protein, fat, carbohydrates, potassium, calcium, manganese, phosphorus, iron, amaranthine, routine, purine, niacin and vitamins A, B1, B2, C, carotene, chlorophyll, and saponins.<sup>16</sup>

In line with the theory by<sup>17</sup> it is said that prevention or overcoming anemia (decreased levels of Hb) can be done by consuming foods or vegetables that contain iron, such as red spinach. Red spinach is a tall plant that grows in lowlands to mountains. Besides, red spinach contains a lot of substances in it. In every 100 grams of red spinach there is 41,2 Kcal of energy, 2,2 grams of protein, 0,8 grams of fat, 520 mg of calcium, 6,3 grams of carbohydrates, 2,2 grams of fiber, as much as vitamin C 62 mg, and 7 mg of iron. For this reason, consuming this type of spinach is very suitable for everyday life and prevents anemia.<sup>17</sup>

## CONCLUSION

1. Provision of Fe tablets has an effect on increasing hemoglobin levels of pregnant women at Sikumana Health Center.
2. Provision of Fe tablets and red spinach juice has an effect on increasing hemoglobin levels of pregnant women at Sikumana Health Center.
3. Provision of Fe tablets and tomato juice has an effect on increasing hemoglobin levels of pregnant women at Sikumana Health Center.
4. The provision of Fe tablets and red spinach juice was faster and more effective in increasing hemoglobin levels compared to green bean juice with Fe tablets and tomatoes with Fe tablets.

## Recommendation

It is recommended that health workers/Health Center be able to further increase education about anemia to increase the knowledge of pregnant women about anemia and matters related to anemia.

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