

# The Combination of Spinach, Tomato Juice and Honey to Improve the Levels of Hemoglobin on Pregnant Women Anemia

Wilda Wahyuni Siregar<sup>1</sup>, Dwi Handayani<sup>1</sup>, Raisha Octavariny<sup>1</sup>, Diah Evawanna Anuhgera<sup>1</sup>,  
Nikmah Jalilah Ritonga<sup>1</sup>, Supran Hidayat Sihotang<sup>2</sup>,  
<sup>1</sup>Institut Kesehatan Medistra Lubuk Pakam, Sumatera Utara, Indonesia  
<sup>2</sup>Universitas Tjut Nyak Dhien, Sumatera Utara, Indonesia

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Abstract : Anemia on pregnancy will adversely affect the mother, whether in pregnancy, childbirth and during childbirth and subsequent periods. Anemia management in pregnancy can be in the form of non-pharmacological therapy. Namely by consuming a combination of spinach juice, tomatoes and honey. The purpose of this study was to find out the effect of the combination of spinach juice, tomatoes, and honey on the handling of anemia in pregnant women. This research used quasy experimental with a non equivalent control group design which was divided into experimental and control groups. The population in this study were all pregnantwomen in Merbau health center at Merbau fence district 2019, average 78 people. Samples taken as many as 20 people, obtained used non-probability techniques with a purposive sampling. The results showed that the effect of giving a combination of spinach juice, tomatoes, and honey to improving hemoglobin levels on pregnant women anemia with a mean difference of 0.54 and *p value* of 0.015. So, it could be concluded that the combination of spinach, tomatoes juice and honeyhas been proven to increase hemoglobin levels in pregnant womenanemia 5 times better, compared to pregnant women anemia without juice combination intervention.

## 1 INTRODUCTION

Maternal Mortality Ratio (MMR) is a sensitive indicator on describing the welfare of the people in a Country. Maternal death by definition of the World Health Organization (WHO) is death during pregnancy or in the 42-day period after the end of pregnancy, due to all causes related to or exacerbated by pregnancy or treatment, but not caused by accident or injury (WHO, 2012). In 2015, the ratio of maternal mortality ratio (MMR) was defined as the number of maternal deaths per 100,000 live births.

Maintaining pregnancy is a phase in the growth of the child because the prospective mother and the baby she is carrying requires considerable nutrition. Nutritional deficiencies in the mother and fetus can result serious problems. The risks of complications for mothers include anemia, bleeding, low birth weight, and contracting infectious diseases. This risk if left unceasing can lead to death (Riskesdas, 2010).

Anemia on pregnancy is blood hemoglobin level <11g / dL in the first and third trimesters, and <10.5g / dL in the second trimester. Physiologically, maternal blood circulation during pregnancy will change, namely an increase in blood volume where the amount of blood serum is greater than the growth of blood cells, resulting in blood thinning (hemodilution) starting at 16 weeks 'gestation and peaking at 32-36 weeks' gestation (32-36 weeks gestation) Novie, 2014).

According to the World Health Organization (WHO) (2012) the prevalence of anemia in pregnant women in the world reaches 41.8%. Asia is ranked second in the world after African continent with a percentage of the prevalence of anemia sufferers in pregnancy reaching 48.2%. Puspongoro's research and Anemia World Map, in 2012 Indonesia was one of the countries in Asia with a high incidence of anemia in pregnancy of 51% (Lampost, 2013).

Anemia prevalence of pregnant women in Asian countries is Myanmar as much as 33.3%, Philippines 32.3%, Thailand 30%, Indonesia 29.6%, Singapore

28.5%, Brunei Darussalam 28.0%, Malaysia 26.6%, and Vietnam at 23.5% (

Mothers during pregnancy, really need a lot of nutrition, especially the need for iron, the need for iron plays an active role in the formation of hemoglobin in the mother's blood, this is closely related to growth and health between mother and fetus (Sulung, 2018).

Anemia on pregnancy which is most often found is due to too few healthy red blood cells because too little iron levels in the body (iron deficiency) and acute bleeding are not even rare both are interrelated (Leveno, 2009). Anemia that occurs during pregnancy is a nutritional disorder as a result of incorrect eating patterns in pregnant women (Ojofeitimi, 2008). Handling is usually done to overcome anemia in pregnant women is to give 60 mg of Fe tablets and 50 nanograms of folic acid during pregnancy (Dinkes Sumut, 2013).

A mother who is often pregnant has the risk of anemia in subsequent pregnancies if he does not pay attention to nutritional needs. A mother with a first pregnancy can also be at risk of anemia because they do not have experience so that it impacts on behavior related to nutritional intake (Madhavi, 2011).

During pregnancy, there is an increase in iron requirements to 1000 mg. As much as 300 mg is used for the fetus and placenta, 500 mg for Hb production and 200 mg is lost through the digestive tract, urine and skin. Hemoglobin is very important in the transport of oxygen, because it has the ability to bind with oxygen to form oxyhemoglobin. This bonding ability is influenced by blood pH and temperature. Iron is the main element in the formation of hemoglobin. An adult's body contains about 50 mg of iron per 100 ml of blood. The total requirement for iron is between 2-6 grams, depending on body weight and hemoglobin levels. The hormone that is important in the formation of red blood cells is the erythropoietin hormone. Iron absorption occurs in the stomach, duodenum and upper jejunum. Erosive esophagitis, gastric, duodenal ulcer, cancer and colonic adenoma will affect iron absorption (Tanto, 2014).

Anemia prevention program carried out by the government is to give blood-added tablets, which are Fe preparations which aim to reduce the number of anemia in infants, hamill mothers, postpartum mothers, adolescent girls, and WUS (Fertile Age Women). Prevention of anemia in pregnant women is carried out by giving 90 Fe tablets to pregnant women during the pregnancy period. The target of giving Fe as many as 90 tablets does not reach

100%. The difficulty faced by the government is the compliance of pregnant women in consuming blood-boosting tablets (North Sumatra Health Office, 2013). This could be due to the ignorance of pregnant women about the importance of Fe tablets during pregnancy. This iron therapy can be combined with herbal therapy which is usually very popular with the public (Nuraysih, 2015).

Iron is part of the hemoglobin molecule, with the reduction of iron, the synthesis of hemoglobin will decrease and result in decreased hemoglobin levels. Decreased hemoglobin levels affect the ability to deliver oxygen to all body tissues so as to reduce work productivity or reduce the ability to concentrate (Depkes RI, 2010)

Iron is a substance that is difficult for the body to absorb. Therefore, the administration of Fe tablets alone is less effective in increasing hemoglobin levels, especially if the mother is not compliant to consume Fe tablets. Complementary therapy is an alternative therapy used together or in addition to conventional medicine (Vitahealth, 2006).

Iron is a substance that is difficult to be absorbed by the body so vitamin C is needed so that iron can be absorbed optimally. This is consistent with the results of Zulaekah's research which states that supplementation with iron and vitamin C is more effective in increasing hemoglobin levels and red blood cell counts than administration of iron alone or vitamin C alone. One of the fruits that have vitamin C and compounds useful for health is tomatoes. . The content of tomatoes in 180 grams is 24.6 mg of vitamin, 0.49 mg of iron, and 27 mcg of folic acid (The George Mateljan Foundation, 2010).

In addition tomatoes, spinach also contains iron to prevent anemia. Iron content in green spinach. Iron is important for the formation of hemoglobin. hemoglobin to carry oxygen throughout the body, including the placenta. Red spinach and green spinach do not differ in terms of nutritional quality, only red spinach has anthocyan pigment that is not found in green spinach. There are differences in iron content in red spinach and spinach which is 2.2 mg / 100 grams and 3.9 mg / 100 grams (Lingga, 2010).

At present, there are 14T in MCH services at ANC, one of which is anemia examination. This program has the support of the government to provide additional iron for pregnant women, in the form of Fe tablets, but in fact in the field, there are still many pregnant women who are still lazy to consume it, even many who do not know. With this, herbal alternatives might be more able to replace iron nutrients and more attractive to mothers (Sulung, 2018).

Others ingredient that is often used in making juice is honey. Honey is a snack containing iron (Fe), vitamin C, vitamin B complex and folic acid which can help the formation of red blood cells. The combination of spinach, tomatoes, and honey which all have high Fe content will be able to increase Hb levels in pregnant women with anemia. In addition as a natural sweetener, honey is also efficacious for pregnant women, namely as a treatment for nausea felt by pregnant women. Honey also has other benefits when mixed with other herbal ingredients (Nuraysiah, 2015).

According to Bakta, iron deficiency anemia can be caused by low iron intake, impaired iron absorption in tissues and organs, and iron loss due to bleeding for a long time. Iron loss as a result of relatively long bleeding can originate from:

1. Gastrointestinal tract: as a result of peptic ulceration, use of salicylates or NSAIDs, gastric cancer, diverticulosis, hemorrhoids, and hookworm infections.
2. Genital tract (female): in women the menstrual cycle causes bleeding every month.
3. Urinary tract: hematuria.
4. Airway: hemoptysis.
5. Nutritional factors, namely due to lack of total iron in food (lack of intake) or low quality of iron (bioavailability) of iron.
6. The need for iron increases, as in prematurity, children in infancy, and pregnancy.
7. Impaired absorption of iron, as in gastrectomy and chronic colitis, or consumed together with phosphate (vegetables), tannins (tea and coffee), polyphenols (chocolate, tea and coffee), and calcium (milk and milk products).

The purpose of this study was to find out the effect of giving a combination of spinach juice, tomatoes and honey to increase hemoglobin levels on pregnant women anemia.

## 2 RESEARCH METHOD

This study used a quasy experimental research design with a non equivalent control group design. Pregnant women with mild / moderate anemia who agree to be respondents in this research will be examined first to find out initial hemoglobin levels. After that divided into two groups, namely the experimental group and the control group. The population of this rsearch were 78 people, while the sample amounted to 20 respondents. Samples were

taken using a purposive sampling technique with inclusion criteria for trimester II and III pregnant women with mild / moderate anemia with hemoglobin levels of 8-10 mg / dl. Each respondent also had to consume Fe tablets regularly from the first trimester. Direct data collection was obtained from respondents by measuring hemoglobin levels by using the Easy Touch digital measuring device to see the changes that occurred. Measurements were made using the pretest and posttest techniques in the experimental group while those in the control group were only for comparison without any treatment.

### 2.1 Research Sites

This research conducted at Pagar Merbau Health Center, Deli Serdang District, 2019.

### 2.2 Tools and Material Used

In this study the tools and materials used include:

- 1) Blender
- 2) Cup / glass
- 3) Knives, scales
- 4) 180 grams of clean green spinach leaves
- 5) 180 gr tomatoes
- 6) 500 cc of boiled water
- 7) 2 tablespoons of honey.

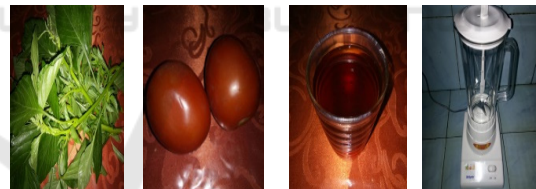


Figure 1: Tools dan Material for Making Tomato, Spinach dan Honey Juice

### 2.3 Implementation Procedure

- A. Attitudes and Behavior
  - 1) Greet and introduce yourself
  - 2) Explain the intent and purpose
- B. Content
  - 1) Asking and reviewing complaints
  - 2) Eye contact with patients
  - 3) Provide an explanation to patients and families how to consumed spinach juice, tomatoes and honey at a dose of 180 grams or ±

- 5 strands of spinach leaves, 1 medium-sized tomatoes and 2 tablespoons of honey once a day.
- 4) Explain how to process or how to make spinach juice and tomato juice, namely:
    - a) Choose fresh spinach and tomato leaves.
    - b) Equal the spinach and tomato leaves.
    - c) Washing spinach leaves and tomatoes with running water.
    - d) Boil spinach in boiling water for 5 minutes, then drain. But for the tomatoes directly drained without boiling first.
    - e) All ingredients are blended and added with 2 tablespoons of honey and 500 cc of mineral water then filtered into a glass.
    - f) Spinach juice and tomato juice are ready to be served.
    - g) Providing opportunities to ask the questions
- C. Technique
- 1) Systematic and sequential actions
  - 2) Response to the patient's reaction
- D. Termination
- 1) Evaluate the action
  - 2) Say hello

### 3 RESULTS AND DISCUSSION

The Data collection was performed using direct measurements to study respondents to know changes hemoglobin levels. Hemoglobin levels on pregnant women are measured by pretest and posttest using a digital hemoglobin meter (Easy Touch brand). Statistical analysis was used through two stages, namely using univariate and bivariate analysis using dependent T-test and independent T-test.

#### 3.1 Univariate Analysis

The majority of respondents in the study were aged 20-35 years as many as 11 people (55%) with the most gestational age being trimester 2 namely 12 people (60%). According to Gravida, the most respondents are multigravida, 11 people (55%), and the most education is high school education, 13 people (65%).

Table 1. Frequency distribution of respondent characteristics

Characteristics	Eksperiment dan Control Group	
	N	%
Age		
- <20 year	6	30
- 20-35 year	11	55
- >35 year	3	15
Total	20	
Gestational Age		
- Second Trimester	12	60
- Third Trimester	8	40
Total	20	
Gravida		
- Primigravida	9	45
- Multigravida	11	55
Total	20	
Education		
- Senior High School	13	65
- PT	7	35
Total	20	

Prior to the intervention of the patient, the researcher took HB measurements in the control group and the experimental group. This is done to determine the changes that occur in HB pregnant women with anemia after being given an intervention. hb pregnant women before the intervention can be seen in table 2.

Table 2. The Results of Hemoglobin Level Measurement on Pregnant Women Anemia Before Intervention

No	Respondent	Control Group	Eksperiment group
		Hb Levels	Hb Levels
1	Px 1	8,6 mg/dl	9,7 mg/dl
2	Px 2	9,2 mg/dl	10,2 mg/dl
3	Px 3	8,8 mg/dl	8,5 mg/dl
4	Px 4	9,0 mg/dl	9,0 mg/dl
5	Px 5	8,7 mg/dl	8,7 mg/dl
6	Px 6	9,9 mg/dl	10,0 mg/dl
7	Px 7	8,9 mg/dl	9,9 mg/dl
8	Px 8	8,6 mg/dl	8,6 mg/dl
9	Px 9	8,8 mg/dl	9,0 mg/dl
10	Px 10	9,7 mg/dl	9,4 mg/dl

After the intervention, an increase in hemoglobin in each respondent was obtained. The increase in hemoglobin can be seen in table 3.

Table 3. The Results of Hemoglobin Level Measurement on Pregnant Women Anemia After Intervention

No	Respondent	Control Group	Eksperiment group
		Hb Levels	Hb Levels
1	Px 1	8,7 mg/dl	10,5 mg/dl
2	Px 2	9,1 mg/dl	11,1 mg/dl
3	Px 3	8,8 mg/dl	11,7 mg/dl
4	Px 4	9,2 mg/dl	10,8 mg/dl
5	Px 5	8,8 mg/dl	9,5 mg/dl
6	Px 6	10,1 mg/dl	11,2 mg/dl
7	Px 7	8,9 mg/dl	10,9 mg/dl
8	Px 8	8,4 mg/dl	9,1 mg/dl
9	Px 9	8,8 mg/dl	10,2 mg/dl
10	Px 10	9,8 mg/dl	11,4 mg/dl

The average hemoglobin level of pregnant women before being given a combination therapy of spinach juice, tomatoes and honey is 8.42 in the experimental group and 8.54 in the control group.

Table 4 Averages hemoglobin levels of pregnant women before intervention in the experimental and control groups.

Variable	Amount	Mean	SD
Hb Levels			
-Eksperiment Group	10	8,42	0,4
-Control Group	10	8,54	0,4
Total	20	100,0	1

The average value of hemoglobin levels on pregnant women after the intervention, namely 9.10 in the experimental group and 8.56 in the control group.

Table 5 Average hemoglobin levels after intervention in the experimental and control groups

Variable	Amount	Mean	SD
Hb Levels			
-Control Group	10	8,56	0,42
-Eksperiment Group	10	9,10	0,45
Total	20	100,0	

### 3.2 Bivariate Analysis

All respondent characteristics between the control group and the experimental group were homogeneous with  $p(0.376-0.702) > \alpha(0.05)$ .

Table 6 Homogeneity of Respondent Characteristics

Characteristics	p value
- Age	0,376
- Gestational age	0,618
- Gravida	0,702
- Education	0,667

Table 7. Mean hemoglobin levels of pregnant women in the experimental group before and after the combination therapy spinach juice, tomatoes and honey

Variable	Amount	Mean	SD	P
-Control Group	10	8,56	0,42	0,015
-Eksperiment Group	10	9,0	0,45	
Total	20	100,0		

Anemia is a condition where the erythrocytes and / or circulating hemoglobin do not fulfill their function to provide oxygen for body tissues. The most common anemia is anemia caused by iron deficiency. Iron deficiency anemia is anemia arising from empty body iron reserves, so that the supply of iron to erythropoiesis is reduced, which in turn results in reduced hemoglobin formation.

Iron is one of the important elements that are included in one of the forming of blood hemoglobin. The function of hemoglobin is to transport oxygen and circulate it to all body tissues. If it is not met, it will cause interference with various organs of the body. So that it takes sufficient iron content to adjust the iron needs in various organs.

Green spinach leaves (*Amaranthus hybridus* L) contain iron (Fe) of 6.43% mg per 180 grams. The function of substances that form red blood cells, resulting in the production of red blood cells in the body so that hemoglobin levels will be normal (Arisman, 2007). Iron is a mineral that is needed in the process of hemopoiesis, but iron is a substance that is difficult to be absorbed by the body. In the digestion process, continue the process of reduction from the ferric form (Fe<sup>3+</sup>) to ferrous (Fe<sup>2+</sup>) so that it is easily absorbed (Winarno, 2004).

As explained by ARAB (2009) that organic acids such as ascorbic acid (vitamin C) can help the absorption of iron by reducing ferric to ferrous

materials that are easily absorbed 3-6 times. Source of vitamin C mostly comes from vegetables and fruit. One of the fruits that have vitamin C and compounds useful for health is tomatoes. Besides containing lots of vitamin C, tomatoes are also a delicious fruit for consumption. Therefore the combination of green spinach leaves and tomatoes with high iron content and tomatoes with vitamin C which accelerates the absorption of iron in the body can increase the production of red blood cells so that hemoglobin levels also increase.

Madhavi & Singh's research (2011) with the title "Nutritional status of rural pregnant women" also found that pregnant women with anemia were most prevalent in multigravidas as much as 79.48% and in primigravidas as much as 20.52%. A mother who is often pregnant has the risk of anemia in subsequent pregnancies if he does not pay attention to nutritional needs. A mother with a first pregnancy can also be at risk of anemia because they do not have experience so that it impacts on behavior related to nutrition intake. A mother with a first pregnancy can also be at risk of anemia because they do not have experience so that it impacts on behavior related to nutrition intake.

This study is also in line with the research of Luluk, et al (2018) which states that the influence of Hb levels in pregnant women before and after being given spinach juice, tomato juice. This is because, the combination between the two is very good, where spinach contains iron which is a mineral that is needed by the body in the process of hemopoiesis. While tomato juice that contains Vitamin C can help the process of absorption of iron by reducing ferries to ferrous materials that are easily absorbed 3-6 times.

According to the analysis of researchers the influence of HB levels of pregnant women with anemia before and after being given spinach juice, tomato juice and spinach and tomato juice combinations because spinach contains a lot of iron, which is a mineral that is needed in the process of hemopoiesis. Vitamin C can help the absorption of iron by reducing ferries to ferrous materials that are easily absorbed 3-6 times.

The results of this study are also in line with research conducted by Wijayanti (2006) entitled "Test the effectiveness of spinach juice in increasing blood hemoglobin levels in white rats (*Rattus norvegicus*)." This type of research is a true experiment (True Experimental Design) by using a Completely Randomized Design. (CRD) consisting of 6 treatments and 4 replications. The sample used was 24 female white rats aged  $\pm$  2 months and with

BB  $\pm$  200gr. Based on the results of the analysis with the Anova test one factor followed by the Duncan's test showed that there was effectiveness in the administration of spinach juice in increasing blood hemoglobin levels in white rats. Based on the results of statistical tests in this study it can be concluded that the administration of combination therapy of spinach and tomato juice is effective in increasing hemoglobin levels in pregnant women with anemia.

Results of research conducted by S Mehnaz et al research titles on Iron, Folate and Vitamin C supplementation on the prevalence of iron deficiency anemia in women who are not pregnant with anemia in the suburbs of Aligarh. The results show that the woman experienced an increase in iron after being given Vitamin C, folic acid, and iron.

As we know honey is a cure for all types of diseases. Its contents are good for the body so honey can be consumed as a supplement in daily life. Honey contains many minerals such as sodium, calcium, magnesium, aluminum, iron, phosphorus, and potassium. The vitamins contained in honey are thiamin (B1), riboflavin (B2), ascorbic acid (C), pyridoxine (B6), niacin, pantothenic acid, biotin, folic acid, and vitamin K. One way of using honey is by add or mix herbs that have certain health benefits. These properties can be to maintain health, treat illnesses and care for the body. The mixture of honey and herbs is called herbal honey. Herbs are medicinal herbs, a mixture of certain types of herbs and honey in the treatment of a disease will have a good impact. The combination of herbs and honey will increase strength in treating the disease. Therefore, there is no doubt that besides being used as a flavoring (sweetener) for honey juice, it can also be utilized for pregnancy benefits.

Honey is a snack containing iron (Fe), vitamin C, vitamin B complex and folic acid which can help the formation of red blood cells. So by consuming honey in pregnant women who suffer from anemia can help increase the formation of red blood cells.

According Bogdanov (2015) said that dark chestnut type honey has a strong effect on blood circulation which can prevent anemia and prevent infection in urinary tractus. honey). Mice that received dark honey supplements were able to maintain hemoglobin levels equivalent to hemoglobin levels at the start of the experiment.

## 4 CONCLUSION

The combination of spinach juice, tomatoes and honey has been showing to increase levels of hemoglobin on pregnant women with anemia 5 times better, compared to pregnant women anemia without juice combination intervention.

## 5 SUGESTION

The Public Health Center (puskesmas) are expected to continue to improving and maintain promotive and preventive efforts, especially in antenatal services. Promotive and preventive efforts can be in the form of a routine supplementation of iron (Fe) tablets every month and provide health education about complementary therapies that can be used to help increase hemoglobin levels on pregnant women, one of which is a combination therapy of spinach juice and tomatoes.

For educational Institutions, it is expected to be used as evidence based practice in efforts to develop knowledge.

Pregnant women are expected to continue to increasing awareness and motivation of the importance of health during pregnancy and to prevent complications both during pregnancy and in the labor process. The trick is to regularly check her pregnancy in antenatal care services and consume iron tablets as well as a combination of spinach and tomato juice as a complementary therapy to increase hemoglobin levels in the mother's blood.

Further researchers can make this research as evidence based and additional information to develop further research on the other benefits of combination therapy of spinach juice, tomatoes and honey on health with a greater number of samples and better research techniques.

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