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# THE EFFECT OF SPINACH CONSUMPTION ON INCREASING HAEMOGLOBIN IN PREGNANT WOMEN

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**Abstract**

**Background**: Anemia is a symptom of a lack of red blood cells due to low hemoglobin levels. Based on the performance assessment report of the Tuban Regency Senori Community Health Center East Java Indonesia in 2022, it was found that 36.65% of pregnant women experienced anemia. This shows that there are still many pregnant women who experience anemia and need treatment. The aim of this research is to determine the effect of spinach consumption on increasing hemoglobin levels in pregnant women. **Method:** quasi experiment with One Group Pretest-Posttest design. The sample in this study was 16 pregnant women with anemia in the Senori Community Health Center Tuban Regency East Java Indonesia, who met the inclusion criteria. The research instrument used an observation sheet to determine hemoglobin levels in the blood before and after consuming green spinach, an easy touch Hb level check tool. Data were analyzed using paired T-test. **Result :** The average Hb level of pregnant women before the intervention was 10.20 gr% and after the intervention was 11.18 gr%, the results of the paired t-test showed a significance value = 0.000, so the significance value (2-tailed) < α (0 .05) which shows that there is an effect of spinach consumption on increasing hemoglobin levels in pregnant women. **Conclusion :** There is an effect of spinach consumption on increasing Hb levels in pregnant women. Integrated ANC activities are expected to be carried out routinely so that pregnant women who experience anemia can be detected early and health workers can provide explanations to pregnant women about the dangers of anemia during pregnancy and the consumption of spinach and its benefits.

keyword : Anemia, Hemoglobin, Pregnant women, Spinach Consumption,

## INTRODUCTION

Iron has a function in forming hemoglobin, minerals and enzymes. Pregnant women who are deficient in iron can experience fetal death, abortion, birth defects, low birth weight, reduced iron reserves in children or children born with nutritional anemia. This condition causes a high infant mortality rate, as well as maternal mortality, because anemia can cause bleeding during childbirth which is the main cause (28%) of maternal/natal maternal deaths in Indonesia.

Anemia is a major health problem in developing countries and is associated with increased maternal and infant mortality rates, premature births, low birth

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weight babies and other adverse effects. Anemia in pregnancy is often called "potential danger to mother and child". WHO classifies anemia in pregnant women into four categories: 1) not anemic if the Hb level is ≥ 11 gr%, 2) mild anemia if the Hb level is 9-10 gr%, 3) moderate anemia if the Hb level is 7-8 gr% and 4 ) severe anemia if the Hb level is <7 gr%.

According to the regulations, iron tablets or what can be called the method given to pregnant women must be consumed every day. Side effects caused by consuming iron tablets include discomfort in the pit of the stomach, nausea, vomiting, diarrhea and constipation (Is Susiloningtyas, 2018). One alternative to meet iron needs apart from consuming iron tablets can be done in a non-pharmacological way, by increasing the consumption of foods rich in iron and protein, such as liver, eggs, poultry, meat, fish, nuts and green vegetables ( Herlin & Aryaneta, 2019).

Several vegetables are included in food sources that contain high iron, such as potatoes which contain iron of 1.9 mg/100 g, pumpkin of 1.4 mg/100 g, asparagus of 2.2 mg/6 stems, fruit beets amounting to 1.6 mg/g, and spinach which has a fairly high iron content, 3.9 mg/100 g. (Yudhistira et al., 2019). Green spinach (Amaratus sp) is a plant that is usually cultivated for consumption as a vegetable companion to rice. the harvest cycle is very fast (2 weeks) and the price is cheap. Spinach has many benefits for the body because it contains calcium, vitamin A, vitamin E, vitamin C, fiber and also beta-carotene. Apart from that, spinach also has high iron content to prevent anemia. Because the iron content in spinach is quite high, plus the content of B vitamins, especially folic acid, if there are people who are deficient in iron, they are usually advised to consume this vegetable regularly and in ancient times spinach was consumed by pregnant women and mothers giving birth

## METHOD

The research design used in this study was a quasi experiment with a One Group Pretest-Posttest research design. Respondents in this study were all pregnant women with anemia in November 2023 at the Senori Community Health Center with a sample of all pregnant women with anemia in the Senori Community Health Center area Tuban Regency East Java Indonesia with a total of 16 respondents. To

obtain the necessary data, Give 250g of green spinach per day for 2 weeks or 14 days. The Green spinach cooked by the pregnant women before consuming it. Data collection techniques start from the preparation stage and the implementation stage to respondents. Everyday researcher evaluate the consuming by Online to the women. The hemoglobin level has been collected an easy touch Hb level check tool before consuming green spinach and 14 after. Then data processing is carried out using the stages of editing, coding, data entry, data cleaning. The data analysis technique used in this research is the Wilcoxon test using 95 % significancy.

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## RESULT AND DISCUSSION

Table 1. Frequency Distribution of Hb Level of Pregnant Women before consuming Green Spinach

| Hb levels | Frequency | Percentage (%) |
|---|---|---|
| Mild Anemia (Hb 9 – 10.9 gr%) | 15 | 93.75 |
| Moderate Anemia (Hb 7 – 8.9 gr%) | 1 | 6.25 |
| Severe Anemia (Hb < 7 gr%) | 0 | 0 |
| **Total** | **16** | **100** |

it is known that before consuming green spinach, almost all respondents, 15 people (93.75%) experienced mild anemia (Hb levels 9-10.9 gr%).

According to the World Health Organization (WHO), anemia in pregnant women is a condition in which the mother has an Hb level of less than 11 gr%, mild anemia with an Hb level of 9-10.9 gr%, moderate anemia with an Hb level of 7-8.9 g% and severe anemia if the Hb level is <7 gr%. Anemia in pregnancy causes serious complications for pregnant women both in pregnancy, childbirth and postpartum, it can cause miscarriage, easy infection, postpartum bleeding, intrapartum and postpartum infectious shock. Meanwhile, the effect of anemia on the fetus can reduce the body's metabolic ability so that it interferes with the growth and development of the fetus in the womb, the fetus can be born with low birth weight, there are congenital defects, easy to get infections and can cause perinatal death (Zuiatna et al., 2021).

Hemoglobin levels during pregnancy are very important to be checked regularly by checking hemoglobin levels and consuming healthy and balanced nutrition so that during pregnancy there is no decrease in hemoglobin levels. Low hemoglobin levels are mostly caused by diet, so that nutritional intake is

insufficient, for example, not consuming enough food that contains important nutrients or substances such as iron, vitamin B12, vitamin C to folic acid as part of red blood cell production, lack of nutrients or important substances such as iron, vitamin B12, vitamin C to folic acid has an impact on anemia in pregnancy (Dhilon et al., 2020).

During pregnancy, the body experiences significant changes, the amount of blood in the body increases by about 20-30%, thus requiring an increase in the need for iron and vitamin supplies to make hemoglobin. Anemia in pregnancy occurs due to hemodilution. In addition to physiological changes during pregnancy, a common cause of anemia in pregnant women is malnutrition or inadequate iron intake (malnutrition) which is associated with increased iron requirements during pregnancy. The cause of pregnant women experiencing anemia is also due to a lack of consumption of foods containing iron, during pregnancy the fetus continues to grow so that the need for iron increases if the food eaten by pregnant women does not contain enough iron, it can cause anemia (Pudiastuti, 2016).

Based on the results of research and theory, researchers argue that the occurrence of anemia in pregnancy can certainly be caused by various factors, the occurrence of hemodilution which is a physiological change in the body of pregnant women is the main cause where the Hb levels of pregnant women decrease, the decrease in Hb levels of pregnant women will be even worse if pregnant women do not have good knowledge about fulfilling nutrition during pregnancy so that mothers do not pay attention to nutritional needs during pregnancy so that pregnant women are susceptible to anemia.

Giving spinach is an effective way that can increase the hemoglobin levels of pregnant women. (Sumiati et al., 2021). Every 100 grams of green spinach (Amaratushibridus sp.) contains 2.3 mg of protein, 3.2 mg of carbohydrates, 8.3 mg of iron and 81 mg of calcium. Spinach is very rich in various vitamins and minerals, vitamin A, vitamin C, niacin, thiamine, phosphorus, sodium, ribolvin, potassium and magnesium. Spinach is a vegetable that has complete nutrition for anemia sufferers, the vitamin C contained in spinach also has an important role in iron absorption so that iron can be utilized optimally.

Table 2. Frequency Distribution of Hb Levels of Pregnant Women After Consuming Spinach

| Hb levels | Frequency | Percentage (%) |
|---|---|---|
| No anemia (Hb ≥ 11 gr%) | 11 | 68.75 |
| Mild Anemia (Hb 9 – 10.9 gr%) | 5 | 31.25 |
| Moderate Anemia (Hb 7 – 8.9 gr%) | 0 | 0 |
| Severe Anemia (Hb < 7 gr%) | 0 | 0 |
| **Total** | **16** | **100** |

The results of this study illustrate that the intervention of giving green spinach vegetables can increase the Hb levels of pregnant women who experience anemia, although based on the results of the study each respondent experienced a different increase in Hb levels even though the intervention given was the same, this can be caused by the body's ability to reabsorb iron in each pregnant woman is different, the type of food consumed by pregnant women also plays a role in the absorption of iron by the body. Absorption of iron from food is influenced by the condition of the digestive tract and the content of ingredients in the food (Susiloningtyas, 2012). Therefore, it is important for pregnant women to continue taking Fe tablets regularly, drinking in the right way, for example when taking Fe tablets, do not drink coffee because it will inhibit iron absorption.

The adequacy of iron needs in the body can be met by pharmacological and non-pharmacological methods. Pharmacologically by giving Fe tablets to pregnant women regularly, pregnant women are required to take at least 90 Fe tablets during pregnancy in addition to taking Fe tablets regularly, iron needs can be met with non-pharmacological therapy. Giving spinach is one effective way that can increase the hemoglobin levels of pregnant women. (Sumiati et al., 2021) . Green spinach (Amaratushibridus sp.) per 100 grams contains 2.3 mg of protein, 3.2 mg of carbohydrates, 8.3 mg of iron and 81 mg of calcium. Spinach is very rich in various vitamins and minerals, vitamin A, vitamin C, niacin, thiamine, phosphorus, sodium, riboflavin, potassium and magnesium. Spinach is a vegetable that has complete nutrition for anemia sufferers, vitamin C contained in spinach also has an important role in the absorption of iron so that iron can be utilized optimally.

Consuming spinach leaves regularly is efficacious in curing several types of diseases, so pregnant women are expected to consume spinach leaves as an alternative so that hemoglobin levels do not decrease (Tombokan et al., 2022).

Spinach is effective in increasing Hb levels in pregnant women with anemia if consumed fresh and washed with clean water, then cooked not for too long or more than 4 minutes, because it will remove half of the iron content in spinach, after cooking spinach cannot be consumed for more than 4 hours, because the content in spinach can turn into poison (Soleha et al., 2022).

Based on the results of the study and theory, the researcher argues that it is important for pregnant women to continue to monitor Hb levels during pregnancy so that if anemia occurs, it can be treated immediately. Adequate iron needs in the body can be met by pharmacological and non-pharmacological means, by taking Fe tablets regularly and in the right way and consuming foods that contain a lot of iron.

Table 3. Frequency Distribution of Hb Levels of Pregnant Women Before and After Consuming Spinach

| Hb levels | Before Intervention | | After Intervention | |
|---|---|---|---|---|
| | f | % | f | % |
| No anemia (Hb ≥ 11 gr%) | 0 | 0 | 11 | 68.75 |
| Mild Anemia (Hb 9 – 10.9 gr%) | 15 | 93.75 | 5 | 31.25 |
| Moderate Anemia (Hb 7 – 8.9 gr%) | 1 | 6.25 | 0 | 0 |
| Severe Anemia (Hb < 7 gr%) | 0 | 0 | 0 | 0 |
| **Total** | **16** | **100** | **16** | **100** |

The results of this study are in line with the research conducted by Istianah et al. in 2019 entitled The Effect of Spinach on the Incidence of Anemia in Pregnant Women at the Fatimah Medika Clinic, Terung Kulon Krian, Sidoarjo, obtained a Significance value of 0.000, which means that spinach has an effect on the incidence of anemia in pregnant women at the Fatimah Medika Clinic (Istianah et al., 2019). In Lidia Herlin's study entitled The Effect of Consuming Green Spinach (Amaranthus Sp) on Hb Levels in Pregnant Women with Mild Anemia in the Kundur Barat Health Center Work Area in 2019, the results of the Paired Sample T Test obtained a P Value = 0.000 so it was concluded that there was a difference between before consuming green spinach (Amaranthus sp) and after consuming green spinach (Amaranthus sp). (Herlin & Aryaneta, 2019)

The body of a pregnant woman physiologically experiences many changes due to the adaptation of pregnancy hormones. All systems in the body work to adjust to the conditions that occur. One of them is the cardiovascular system, the system related to the heart and blood circulation. During pregnancy, the blood of pregnant women experiences dilution (hemodilution) due to the addition of blood

plasma volume (hypervolemia) which is not balanced with the number of red blood cells. This causes the Hb levels of pregnant women to decrease (Handayani, 2021). Therefore, the adequacy of iron requirements in pregnant women is not only met by giving Fe tablets, but it is necessary to provide foods that contain a lot of iron or foods that accelerate (enhancer) iron absorption and reduce the consumption of foods that inhibit (inhibit) iron absorption (Rimawati et al., 2018).

Giving spinach to pregnant women is one way to increase Hb levels in pregnant women. Spinach is given to pregnant women after pregnant women are given IEC about the benefits of spinach which are useful for increasing Hb levels and how to process or cook spinach. Pregnant women are given green spinach to be consumed per day as much as 250 grams for 14 days from this amount pregnant women have consumed as much as 290.5 mg of iron. In addition, pregnant women also consume Fe tablets every day containing 60 mg of iron. So that the total iron consumed by pregnant women for 14 days is 1,130.5 mg or as much as 80.75 mg / day. This amount is sufficient for the daily iron needs used by normal humans to produce red blood cells (20-25 mg / day) (Tombokan et al., 2022). In addition, the vitamin C content in spinach can help the absorption of iron by reducing ferric to ferrous which is easily absorbed, therefore consuming spinach and Fe tablets can increase the production of red blood cells so that hemoglobin levels also increase.

Pregnant women who have experienced increased Hb levels are expected to be able to continue to maintain their condition. Although there has been an increase in Hb levels in pregnant women, the increase is still within minimal limits, so pregnant women must routinely check their condition and continue to consume Fe tablets during pregnancy and maintain adequate nutritional intake during pregnancy.

## CONCLUSION AND SUGGESTION

is an effect of spinach consumption on increasing Hb levels in pregnant women in the Senori Health Center work area. Integrated ANC activities are expected to be carried out routinely so that pregnant women who experience anemia can be detected early and health workers can provide explanations to pregnant

women about the dangers of anemia during pregnancy and the consumption of spinach and its benefits.

## DECLARATION

### Conflict of Interest

There is no conflict of interest in this research.

### Authors' Contribution

The lead researcher is responsible for the entire research, from planning, implementation, data analysis and dissemination of results. Research member 1 is responsible for data analysis and discussion. Research member 2 is responsible for respondent selection, data collection and discussion.

### Ethical Approval

This research has been approved by the Research Ethics Board of the Nahdlatul Ulama Tuban Health Sciences Institute with the number 110/0084223523/LEPK.IIKNU/X/2023.

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## Data Availability

The researcher is willing to be contacted if other researchers carry out deeper follow-up on this research in the future, and we are ready to support this

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