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The Effect of Moringa Vegetable + Small Eggplant Therapy on Increasing the Blood Hemoglobin Levels of Pregnant Women in the Working Area of the Lamparinga Health Center North Konawe Regency

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ABSTRACT

Introduction: Pregnancy is a vulnerable period for anemia due to iron deficiency. The prevalence of anemia in pregnant women at the Lamparinga Community Health Center was 26.88% in 2020, 41.17% in 2021, and 57.14% in 2022. Consuming moringa leaves is an alternative to address anemia. Variation therapy with moringa and local vegetables is crucial for pregnant women to support increased hemoglobin levels. This study aims to determine the effect of moringa and small eggplant therapy on increasing hemoglobin levels in pregnant women in the Lamparinga Community Health Center, North Konawe Regency.

Method: Using quantitative research, a pre-test, post-test, one-group design was used. The population was all pregnant women in the Lamparinga Community Health Center working area from 2024 until March, totaling 32 people. A sample of 25 people was selected using simple random sampling.

Result: Using the paired t-test, a p value of 0.001 was obtained for moringa + eggplant on increasing blood hemoglobin levels of pregnant women in the working area of the Lamparinga Health Center, North Konawe Regency.

Conclusion: Moringa and small eggplant therapy has been shown to increase hemoglobin levels in pregnant women. Pregnant women are advised to regularly consume locally sourced foods, including green vegetables and fruits, to increase their hemoglobin levels during pregnancy.

Introduction

Pregnancy is a period that is vulnerable to anemia, the most common anemia encountered in pregnancy is due to iron deficiency.^[1] Pregnancy is a time when blood volume increases (hydreemia or hemodilution), however, as the number of blood cells increases, it is less than the number of plasma cells, resulting in blood dilution (hemophilia).^[2] Anemia in pregnancy occurs because the iron intake through food is not sufficient to meet needs, and during pregnancy, the need for these nutrients is very important to produce more red blood cells for the mother and the fetus she is carrying.^[3]

Maternal Mortality Rate (MMR) is an indicator of the success of health services in a country.^[4] Maternal death can occur due to several reasons, including hemoglobin levels in pregnant women <11 g/dl.^[5] The maternal mortality rate is 70%, for mothers who are anemic and 19.7% for those who are non-anemic.^[6] 15-20% of maternal deaths are directly or indirectly related to anemia where hemoglobin levels fall below normal.^[7]

Anemia is a condition where there is a reduction in red blood cells (erythrocytes) in the blood circulation or hemoglobin (Hb) mass so that it is unable to fulfill its function as an oxygen carrier to all tissues in the body.^[8] Anemia in pregnant women can increase the risk of premature birth, infectious diseases and maternal and child death.^[9]

The World Health Organization (WHO) reported that the global number of anemia cases in pregnant women reached 1.42 billion in 2020, increasing to 1.74 billion in 2021. The prevalence of iron deficiency anemia in pregnant women is approximately 35-75%, increasing with gestational age, and an estimated 30-40% of anemia is due to iron deficiency.^[10]

The prevalence of anemia in pregnant women in Indonesia is still high, namely in 2020 it was 80,975 (3.42%) and in 2021 it was 27.54 and around 40% of maternal deaths are related to anemia in pregnancy, especially iron deficiency anemia.^[11] Data from the Southeast Sulawesi Provincial Health Office shows that the prevalence of anemia among pregnant women in 2019 was 40,192 (63.03%) out of 63,661 visits. In 2020, the number of cases was 46,533 (52.50%) out of 88,646 visits, and in 2021, the number was 14,711 (25.96%) out of 58,952 visits.^[12]

The North Konawe Health Office is one of the working areas in Southeast Sulawesi Province

experiencing an increase in anemia cases. Based on data from the North Konawe Regency Health Office on anemia cases in pregnant women from 2020 to 2022, in 2020 there were 147 (10.18%) cases of anemia out of 1,443 visits by pregnant women. In 2021, there were 156 (11.7%) cases of anemia out of 1,333 visits by pregnant women. In 2022, there were 63 (5.02%) cases of anemia out of 1,253 visits by pregnant women.^[13]

The Lamparinga Community Health Center, within the Konawe Regency Health Office, has a consistently increasing number of anemia cases each year. Data from the Lamparinga Community Health Center on anemia cases in pregnant women shows that in 2020, there were 25 (26.88%) cases out of 93 visits. In 2021, there were 35 (41.17%) cases of anemia out of 85 visits, and in 2022, there were 20 (57.14%) cases out of 35 visits.^[14]

One of the government's efforts to overcome iron deficiency anemia in pregnant women is by providing iron supplement tablets Sulfas Ferosus (Fe).^[15] Nationally, the coverage of pregnant women receiving iron tablets is 85%. The lack of success of the iron tablet program is due to issues related to program management, compliance levels, and the dosing schedule. In addition, iron (Fe) tablets often cause side effects such as heartburn, nausea, vomiting, and diarrhea.^[15] Based on the side effects of giving iron (Fe) tablets that occur in pregnant women, it is necessary to innovate the use of local food made from moringa.^[16]

Currently, giving Moringa leaves is considered to be able to have an impact on treating pregnant women who experience anemia, where Moringa leaves can increase hemoglobin (Hb) levels in pregnant women.^[17] Moringa can be used as a local food-based nutritional supplement for pregnant women to reduce the prevalence of anemia.^[18] A study has shown that moringa plants for pregnant women can increase iron in the body so that it can prevent anemia.^[19]

Consuming Moringa oleifera leaves (Moringa oleifera Lam.) is an alternative to address malnutrition in pregnant women with anemia. Pathophysiologically, the high iron content in the leaves is absorbed in the proximal small intestine and circulated in the blood with hemoglobin, entering enterocytes, or stored in the form of ferritin and transferrin. Three iron absorption pathways are the heme pathway, the ferrous (Fe²⁺) pathway, and the ferric (Fe³⁺) pathway. Other benefits of

Moringa leaves include acting as an antioxidant, lowering blood sugar levels, lowering cholesterol, helping improve memory, and addressing malnutrition in children. Scientific research results prove that the nutritional content of Moringa leaves is 7 times the vitamin C in oranges, 4 times the vitamin A in carrots, 4 times the calcium in milk, 3 times the potassium in bananas, 3 times the iron in spinach and 2 times the protein found in yogurt or the protein in an egg, research shows that the calcium content of Moringa leaves is 497.8 mg/100 grams and the iron content is 6.24 mg/100 grams.^[20]

Based on the above background, the researcher is interested in conducting research on the effect of Moringa vegetable + small eggplant therapy on increasing the blood hemoglobin levels of pregnant women in the working area of the Lamparinga Health Center, North Konawe Regency.

Method

The type of research used is quantitative research, the design of this study is a pre-test post-test one group design. This study was conducted in May-July 2024 in the working area of the Lamparinga Community Health Center. The population of this study was all pregnant women in the working area of the Lamparinga Community Health Center from 2024 to March, totaling 32 people and a sample of 25 people taken using

simple random sampling. Respondent identity data including age, maternal education, maternal occupation, maternal age, gestational age, obtained using an observation sheet. Data on the incidence of blood hemoglobin (Hb) levels were obtained by measuring Hb using a portable Easy Touch Meter. The provision of variations of moringa vegetables with other vegetables was made by researchers with the amount of water given as much as 150 ml with a composition of 15 grams of moringa and 10 grams of other vegetables. Data were analyzed for normality using the Shapiro Wilk test and continued with an effect test using the paired t-test as well as the ANOVA and least significant difference (LSD) tests.

Result

Table 1 shows that the average Hb level before moringa + small eggplant therapy was 10.2 mg/dl and after therapy was 11.9 mg/dl.

Table 2 shows that the results of the paired t-test obtained a p value of $0.001 < \alpha (0.05)$, so H_a is accepted and H_0 is rejected, so it is concluded that there is an effect of Moringa vegetable + small eggplant therapy on increasing the hemoglobin levels of pregnant women in the work area of the Lamparinga Health Center, North Konawe Regency.

Table 1.
Distribution of Average Blood Hemoglobin Levels Before and After Therapy
Moringa-Based Vegetable Variations

| Blood Hemoglobin Levels | n | Mean | Min | Max | St-Dev |
|--|---|------|------|------|--------|
| Moringa Vegetable Therapy + Small Eggplant | | | | | |
| Before intervention (Pre Test) | 5 | 10.2 | 8.6 | 11.7 | 1.14 |
| After intervention (Post Test) | 5 | 11.9 | 10.4 | 13.1 | 0.99 |

Table 2.
The Effect of Moringa Vegetable + Small Eggplant Therapy on Increasing
Blood Levels of Pregnant Women

| Public Health Efforts | Health Center Accreditation Status | | | | Total | |
|-----------------------|------------------------------------|------|----------------|------|-------|-----|
| | Elementary-Intermediate | | Main-Full Moon | | | |
| | n | % | n | % | n | % |
| Good | 10 | 30.3 | 23 | 69.7 | 33 | 100 |
| Not enough | 31 | 81.6 | 7 | 18.4 | 38 | 100 |
| Total | 41 | 57.7 | 30 | 42.3 | 71 | 100 |

Discussion

This study shows that the average Hb level, before the Moringa + small eggplant therapy was 10.2 mg / dl and after therapy was 11.9 mg / dl, which means that there was an increase of 1.7 mg / dl. Giving boiled water and Moringa leaves combined with small eggplant with a composition of 150 ml of water and 25 grams of vegetables every day (morning) was given to pregnant women for 1 week. Based on the results of observations, pregnant women consumed Moringa + eggplant vegetables until they were finished. The results of the paired t-test obtained a p value of 0.001, so it was concluded that there was an effect of Moringa + small eggplant therapy on increasing the blood hemoglobin levels of pregnant women in the working area of the Lamparinga Health Center, North Konawe Regency.

This research is in line with research²¹The results of this mini-research show that there was an increase in HB levels in pregnant women before and after treatment, from mild anemia to normal, so it can be concluded that drinking tamarillo juice has an effect on increasing HB levels in pregnant women. Similarly, previous research also shows that found that turquoise eggplant juice (*Cyphomandra betacea*) can affect the erythropoiesis process by increasing the number of erythrocytes, reticulocytes, hemoglobin levels and hematocrit values of male white mice induced with Chloramphenicol at a dose of 130 mg/kg BW. Then, by treating anemia, the best results were shown by administering turquoise eggplant juice (*Cyphomandra betacea*.Sedtn) to group IV at a dose of 0.52 mL/g BW which is equivalent to 200 mL for human use, proven by a two-way ANOVA statistical test showing $p < 0.05$.^[22]

This research confirms the theory that eggplant (*Solanum melongena* L.) is a member of the Solanaceae family and produces dicotyledonous seeds. The main stem supports the plant, while the branches are the parts of the plant that produce flowers. The main stem is angular, greenish-purple when young, and becomes blackish-purple when mature.^[23] The most commonly known eggplant fruit shapes include cylindrical, oblong, oval, oval and round.^[24] Eggplants generally prefer sandy loam soil and soil containing volcanic ash. Eggplants can grow and produce well in lowlands to highlands at elevations ranging from 1,200

meters above sea level, with a preferred temperature range of 18-25°C.^[25]

According to researchers, Moringa and small eggplants can help increase hemoglobin levels in pregnant women due to the nutritional content of both vegetables. Moringa leaves (*Moringa oleifera*) contain high levels of iron. Iron is an essential component of hemoglobin, a protein in red blood cells responsible for transporting oxygen throughout the body. The vitamin C content in Moringa helps increase iron absorption in the body. Vitamin C converts non-heme iron (a type of iron found in plants) into a form that is more easily absorbed by the body. Then, small eggplants also contain iron, although in smaller amounts compared to Moringa leaves. Consuming small eggplants can contribute to increasing iron levels in the body. In addition, eggplants contain B-complex vitamins, including B6, which helps in hemoglobin production and helps red blood cell function. By consuming Moringa and small eggplants regularly, pregnant women can increase their intake of iron and other essential nutrients, which in turn can help increase hemoglobin levels and prevent anemia.

Conclusion

Moringa and small eggplant therapy has an effect on increasing hemoglobin levels in pregnant women in the Lamparinga Community Health Center, North Konawe Regency. Pregnant women are advised to regularly consume locally sourced foods, including green vegetables and fruits, to increase their hemoglobin levels during pregnancy.

For the Community Health Center to establish a policy of providing local food in the form of moringa, red spinach and okra as food that must be consumed by pregnant women and intensively disseminate the benefits of vegetables in increasing the Hb levels of pregnant women. In addition, it is hoped that pregnant women can be given pocket books or guidebooks on processing vegetables that are useful in increasing Hemoglobin levels.

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