Journal for Quality in Women's Health

EFFECT OF WATER SPINACH (Ipomoea aquatica) CONSUMPTION ON HEMOGLOBIN LEVELS IN PREGNANT WOMEN

Dessy Lutfiasari[1], Alfika Awatiszahro [2]
[1]Bachelor of Midwifery Study Program, Universitas Kadiri, Kediri, Indonesia
[2]Bachelor of Midwifery Study Program, Universitas Kadiri, Kediri, Indonesia
Email: [1]dessylutfiasari@unik-kediri.ac.id , [2]alfika90@unik-kediri.ac.id
Orchid id 0009-0006-0552-7428, 0009-0009-3702-0623, Phone number +681336229675

ABSTRACT

Anemia is a common condition among pregnant women, primarily caused by iron deficiency, and may lead to complications during pregnancy and childbirth. The 2023 Indonesian Health Survey (SKI) reported that 27.7% of pregnant women still experience anemia. Nutritional interventions using vegetables rich in iron and vitamin C, such as water spinach (Ipomoea aquatica), may provide an alternative strategy to improve hemoglobin levels. This study aimed to determine the effect of water spinach consumption on hemoglobin levels in pregnant women. This research used A pre-experimental design with a one-group pretest–posttest approach. The research sample consisted of 30 pregnant women. Hemoglobin levels were measured using a hemoglobin testing device, and observations were recorded on structured sheets. The intervention of giving water spinach leaves was carried out for 2 weeks. Data were analyzed using the Wilcoxon signed-rank test.The mean hemoglobin level before the intervention was 10.013 g/dl, which increased to 11.513 g/dl after consuming water spinach. Statistical analysis revealed a p-value of 0.001 ($p < 0.05$). There is a significant effect of water spinach consumption on hemoglobin levels in pregnant women Water spinach contains vitamin C, which enhances iron absorption, and iron, which supports hemoglobin synthesis. The consumption of water spinach can therefore serve as a practical and alternative intervention to help reduce anemia among pregnant women.

Keywords: Hemoglobin level, Pregnant Woman, Water spinach

1. INTRODUCTION

Anemia is a condition characterized by morphological changes in red blood cells that are insufficient to meet the body's physiological needs (Azzam et al., 2025; Jiang & Zhu, 2022). Anemia is common, especially in developing countries like Indonesia (Beck & Zealand, 2016). Iron deficiency anemia is a global health problem commonly found among young women and children. It is estimated that more than 60% of the world's 6.5 billion population suffers from iron deficiency malnutrition. Globally, over 2 billion people are affected by iron deficiency anemia, which leads to stunted growth, impaired mental development, decreased productivity, increased morbidity and mortality, as well as reduced self-esteem (Dukpa et al., 2017).

The 2025 edition of the WHO estimates on anemia in women aged 15–49 years, by pregnancy status, reveals that anemia remains a major public health concern. Only 18 countries (10% of all countries) have shown progress toward meeting the target, indicating that the world is currently off track to achieve the goal of a 50% reduction in anemia by 2030. The prevalence of anemia in pregnant women aged 15-49 years globally is expected to reach 35.5% by 2023 (WHO, 2020, 2025). The 2023 Indonesian Health Survey (SKI) reported that 27.7% of pregnant women still experience anemia (Kementrian Kesehatan Republik Indonesia, 2023).

Anemia management strategies in Indonesia include improving nutritional intake and iron-folic acid supplementation from adolescence through pregnancy, strengthening antenatal care services through anemia screening and management, and providing education on balanced nutrition involving families and communities. These efforts are reinforced by cross-sector collaboration in providing nutritious food, preventing comorbidities, and monitoring adherence to iron supplementation, which are continuously evaluated to reduce the prevalence of anemia in pregnant women (Kementrian Kesehatan RI, 2018; Zulfikar et al., 2025).

To address this problem, adequate nutritional supplementation is required, such as the consumption of green leafy vegetables. Biofortification of water spinach (Ipomoea aquatica) has the potential to increase iron levels, thereby improving hemoglobin concentration in the blood (Dukpa et al., 2017).

Local plants such as mustard greens, sweet potato leaves, water spinach and cassava leaves are food plants that are rich in iron which can be used by pregnant women as a way to prevent anemia (Setyawati et al., 2023). Water spinach is a short-lived vegetable that is rich in nutrients and a good source of plant fiber and vitamins. 100 grams of water spinach includes 29 calories of energy; 3 grams of protein; 0.3 grams of fat; 5.4 grams of carbohydrates; 1 gram of fiber; 73 mg of calcium; 50 mg of phosphorus; 2.5 mg of iron; 6,300 IU of vitamin A; 0.07 mg of vitamin B1; 32 mg of vitamin C; 89.7 grams of water (Hsieh et al., 2023; Joshi et al., 2021; Nurdini et al., 2025).

This study aims to determine the effect of water spinach consumption on hemoglobin levels in pregnant women who experience anemia.

2. METHODS

The research design used in this study was a pre-experimental approach with a one-group pre-test post-test design. The population in this study were pregnant women with mild anemia in the Nganjuk Regency, with a sample size of 30 people spread across 3 community health centers. The study was conducted in June 2025 using a purposive sampling technique. The selected samples were pregnant women in their second and third trimesters, who did not experience other pregnancy complications and who regularly consumed Fe tablets from the community health center. The study was conducted on pregnant women, with prior

consent from the respondents. The intervention involved providing the pregnant women with cooked vegetable preparations for two weeks, with hemoglobin levels re-measured at the end of the intervention. Various types of dishes were prepared from water spinach, taking into account cooking methods, cooking times, and the composition of the dish compared to other dishes. Respondents were given 200 grams of water spinach for 2 weeks with a cooking time of 2 minutes. The data analysis used was the *Wilcoxon signed-test*.

3. RESULTS

The research results are shown in the following table.

Table 1 Respondent Characteristic

Respondent characteristics showed that

Characteristic	Frequency	%
1. Age		
< 20 years	5	16,6
35 years	17	56,7
>35 years	8	26,7
2. Education		
Primary	10	33,3
Secondary	13	43,3
Higher	7	23,3
. Parity		
Primigravida	9	30
Multigravida	14	46,7
Grandemultigravida	7	23,3

most were aged 20-35, which is the ideal age for pregnancy. Nearly half of the respondents had a secondary education, and almost half were multigravida mothers, with 2-4 children.

Table 2 Respondent Data Before and After Consuming Water Spinach Leaf Vegetables in Pregnant Women

The average pre-test Hb value was 10.013 mg/dl, with a standard deviation of 0.0834. The average post-test Hb value was 11.513 mg/dl, with a standard deviation of 0.4190. It can be concluded that pregnant women who consumed kale experienced an average increase in Hb of 1,5 mg/dl.

The results of the Shapiro-Wilk test for normality of the data obtained a p-value of 0.004 for the pre-test, indicating a non-normal distribution. Meanwhile, the post-test obtained a p-value of 0.089, indicating a normal distribution. Because one of the data points was non-normally distributed, the statistical test used was the Wilcoxon signed-rank test.

The results of the statistical test using the Wilcoxon signed test obtained a p value of 0.001 where the p value is <0.05 so it can be concluded that there is a significant effect of giving water spinach on hemoglobin levels in pregnant women with mild anemia.

4. DISCUSSION

Iron is essential for pregnant women due to hemodilution during pregnancy. In the long term, low dietary iron content or inadequate iron absorption leads to decreased red blood cell and hemoglobin production in the body. During periods of rapid growth, such as fetal growth, the first 2 years of life, and adolescence, red blood cell mass increases; therefore, the body's iron requirements increase. When iron stores are insufficient to carry out cellular functions properly, the individual is in a negative balance (Shamah et al., 2017).

The results of the study show that iron supplementation consumed by pregnant women will be very beneficial if it is balanced with the addition of foods containing vitamin C (Azzam et al., 2025). As is known, water spinach has a high vitamin C content, namely 55 mg per 100 grams, which can help better iron absorption (Fevria et al., 2021). Umu Qonitun's research in 2024 showed that

Intervensi	Freq	Mean	SD
Pre-test	30	10,013	0,083
Posttest	30	11,513	0,419

giving spinach to pregnant women for 2

weeks can overcome anemia in pregnant women with a dose of 250 grams each time given for 2 weeks (Umu Qonitun & Suhartatik, 2024). This study showed an increase in hemoglobin levels of 1.5 gr/dl because the dose used was 200 gr with a duration of administration of 2 weeks.

Water spinach is rich in essential nutrients and is rich in vitamins A, C, and beta-carotene. These nutrients can help reduce free radicals in the body (acting as antioxidants), thereby preventing cholesterol oxidation. Oxidized cholesterol in blood vessel walls can lead to clogged arteries, heart attacks, or strokes. Furthermore, the folate in water spinach can help convert a harmful chemical called homocysteine, which in high levels can lead to heart attacks or strokes. Magnesium is a mineral that lowers blood pressure and provides protection against heart disease (Fevria et al., 2021; Nurhidayati et al., 2023).

Water spinach also contains antioxidant phytochemicals which can also fight heart toxicity and oxidative stress so that it can improve the condition of the body of pregnant women (Mukta et al., 2023).

Proper education is needed regarding the fulfillment of balanced nutrition, especially the correct use of food ingredients to balance the government's program in iron tablet supplementation so that the prevalence of anemia in pregnant women can decrease (Churchill et al., 2025). For example to reduce boredom with consuming water spinach for extended periods, various types of processed water spinach can be used as alternatives. The combination of making catfish nuggets with water spinach and green beans can be an alternative food to increase the iron intake needed by pregnant women (Nurdini et al., 2025).

5. **CONCLUSION**

The conclusion of this study is that giving water spinach has an effect on hemoglobin levels in pregnant women with anemia, with an average increase of 1.5 mg/dL. The results of this study can be recommended to health workers in providing education about consuming water spinach as a food choice to increase hemoglobin in pregnant women. The limitation of this study is that the researcher did not control the food intake consumed by mothers other than water spinach which influences the increase in hemoglobin in the bodies of pregnant women as respondents.

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