

Administration of Pumpkin Seeds Herbal Capsules (*Cucurbita Moschata*) and Iron Supplement Tablets to Increase Serum Ferritin Levels in Pregnancy Anemia

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ABSTRACT

Background: Iron deficiency anemia is the most common hematological problem, affecting approximately 38% of pregnant women globally. Pregnant women who take oral iron supplements often complain of gastrointestinal problems. The 2021 Household Health Survey (HHS) found the prevalence of iron deficiency anemia among pregnant women in Indonesia was 24.5%.

Purpose: The aim of this study was to examine the effect of addition of pumpkin seed capsules (*Cucurbita moschata*) to increase serum ferritin levels in pregnant women with anemia. This type of research is a true ex- experimental study with a pretest-posttest with a control group.

Methods: Serum ferritin test method using the ELFA method (*enzyme-linked fluorescent immunoassay*). The blood sample for the test is 1 ml of serum. The limit of iron deficiency anemia with a value of $<9.3 \mu\text{g/mL}$. The study period was September-October 2024.

Results: The results of the Wilcoxon test showed a Significance value (Sig) in the group given pumpkin seed capsules obtained a p value of 0.001 smaller than $\alpha 0.05$, thus concluding that pumpkin seed capsules (*Cucurbita moschata*) have an effect on increasing serum ferritin levels in pregnant women with anemia.

Conclusion: Pumpkin seeds can be a non-pharmacological remedy for increasing hemoglobin levels if consumed regularly. One effort that can be made to prevent anemia in pregnant women is to utilize local plants as functional foods found around the community's residence.

Keywords: Iron Supplement, Pumpkin Seeds, Pregnancy Anemia

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BACKGROUND

Iron deficiency anemia is the most common hematological problem in pregnancy. It affects approximately 38% of pregnant women globally. Significant adverse effects on pregnancy, mother, fetus, and neonate associated with iron deficiency anemia include maternal complications including fatigue, postpartum hemorrhage, increased risk of cesarean section, postpartum anemia, blood transfusion for labor induction, and neonatal complications including premature birth, low birth weight, increased risk of stillbirth, low Apgar scores at delivery, and increased perinatal and neonatal mortality. (O'Toole et al., 2024).

According to the results of the Basic Health Research (Riskesdas) in 2018, the percentage of anemia in pregnant women in Indonesia was 37.1 %. Based on the results of the Household Health Survey (SKRT), the prevalence of iron deficiency anemia in Indonesia in pregnant women was 63.5% in 1995, falling to 40.1% in 2019, and in 2021 it fell to 24.5%. (Widiastini et al., 2023) . The number of pregnant women with anemia in East Java Province remains high. In 2021, as many as 25.3% of pregnant women experienced anemia. (Istiqumilaily et al., 2023) Meanwhile, in 2021, as many as 29.26% of pregnant women in Mojokerto Regency experienced anemia. (Office, 2021).

Pumpkin is a plant belonging to the gourd family and belongs to the climbing vine group. Furthermore, pumpkins are a highly nutritious food source. Pumpkins are typically harvested for their flesh, which is used to make processed foods and beverages. Not only is the flesh rich in nutrients, but the seeds are just as nutritious. A quarter cup of pumpkin seeds contains about 150 calories, 15 grams of healthy fat, 1 gram of carbohydrates, and 8-10 grams of plant-based protein. Pumpkin seeds are also rich in antioxidants, iron, zinc, magnesium, and various other nutrients. (Almaidah & Ambarwati, 2022).

Increased hemoglobin levels are associated with the health benefits of pumpkin seeds. Several studies have shown that pumpkin seeds can increase serum iron (Fe) and transferrin levels, which are components of hemoglobin. Pumpkin plants are a source of nutrition known to local communities. Pumpkins have many benefits and are readily available at affordable prices. The development of processed pumpkin-based food sources in the archipelago is very rapid, while pumpkin seeds are often discarded by local communities as useless, indicating that pumpkin seeds are not being optimally utilized. (Harlinah & Haumahu, 2022).

The results of Dewi et al.'s (2023) research by giving pumpkin for 30 days. stated that there was an effect of giving pumpkin on the incidence of anemia in adolescent girls in the Sapala Community Health Center, South Kalimantan. Pumpkin has a function to facilitate oxygen circulation in the blood because it contains iron, vitamin C, and vitamin A. The content of L-ascorbic acid in pumpkin can help the process of optimal iron retention so that it can increase hemoglobin levels in the blood. (Dewi et al., 2023).

The results of the study by Sridhar Prasad, et al (2018) entitled *Hematinic and antioxidant potential of aqueous extract of Sesamum indicum seeds against phenylhydrazine-induced hemolytic anemia* with oral administration of herbal seeds at a dose of 200 to 400 mg per day, after 2 weeks, were proven to increase hemoglobin levels and reduce the recovery time of blood parameters progressively by showing the potential for antioxidant effects. These results support the traditional use of herbal seeds in the treatment of anemia. Analysis with ANOVA and t-test using with results $p < 0.05$.

OBJECTIVE

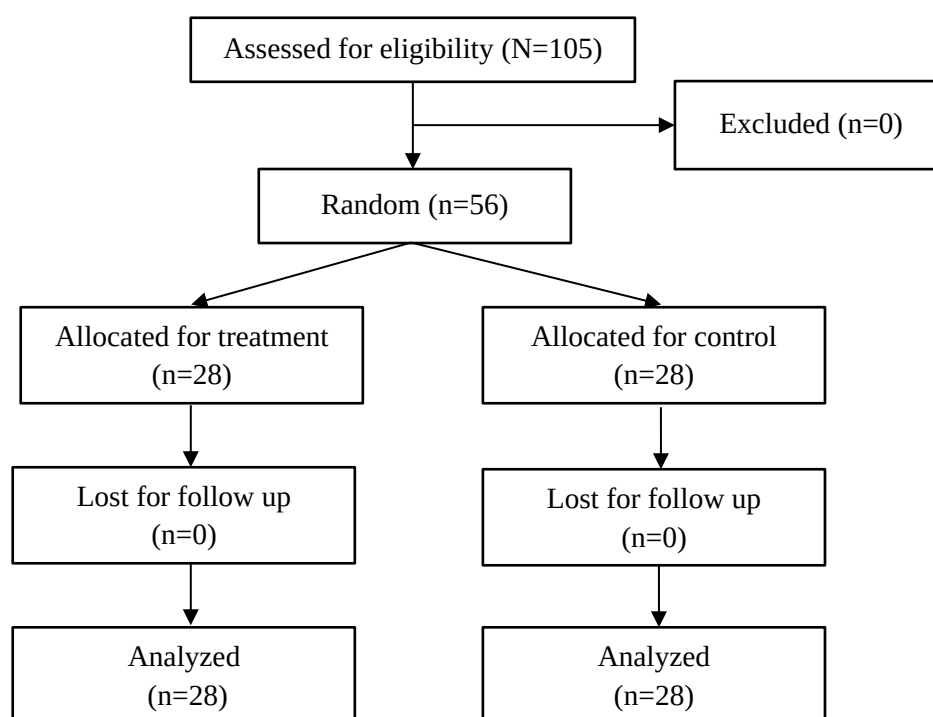
Testing the influence Administration of pumpkin seed herbal capsules (*Cucurbita moschata*) to increase serum ferritin levels in pregnant women with anemia.

METHODS

The type of research used *true experimental*, pretest-posttest research design *with a control group* to measure the effect of the intervention in the treatment group and compared with the control group. The treatment group was given capsules containing iron supplement (60 mg elemental iron and 0.4 mg folic acid) with the addition of herbal ingredients pumpkin seeds. Pregnant women were given a 200 mg dose once daily for 14 consecutive days, taken at night after meals. The control group was only given iron tablets. Research sample Second trimester pregnant women at the Bangsal Community Health Center in Mojokerto who met the criteria. This study involved pregnant women in their second trimester (12-24 weeks) at the Bangsal Community Health Center, Mojokerto. A total of 56 participants were divided into a treatment group (n=28) and a control group (n=28) with Simple Random Sampling. Inclusion criteria included being willing to be research respondents as evidenced by the *informed consent form*, undergoing antenatal care, being pregnant in the second trimester with a gestational age of 12-24 weeks, and inclusion criteria included severe anemia with a hemoglobin level of <7 g/dL, malnutrition with an upper arm circumference of <23.5 cm, suffering from chronic infectious diseases including Hepatitis, HIV, Syphilis, TBC, food taboos or undergoing a certain diet. The study was conducted in September-October 2024. The research instrument used a questionnaire and observation sheet. The Serum Ferritin test examination method used the ELFA method. (*enzyme-linked fluorescent immunoassay*). Statistical analysis using the Wilcoxon and Mann Whitney tests. *ethical clearance* conducted with a review by the Health Research Ethics Commission (KEPK) of the Ministry of Health Polytechnic of Semarang. Researchers submitted *ethical clearance* to ensure that the research to be conducted was in accordance with applicable ethical principles marked by obtaining an *Ethical Approval Certificate* Nomor 1142/EA/F.XXIII.38/2024 E.

RESULTS

The population was all pregnant women in their second trimester (12-24 weeks of gestation). A sample of 56 pregnant women attending antenatal care was selected using *simple random sampling* and divided into two groups of 28. The treatment group received pumpkin seed capsules and the control group received iron supplements only for 14 days. Serum ferritin levels were measured twice, before and after the intervention.

**Figure 1 Research CONSORT Chart****Table 1.** Frequency Distribution of Respondent Characteristics at the Bangsal Mojokerto Community Health Center (n=28)

Respondent Characteristics		Capsule Pumpkin Seeds		Iron Supplement Tablets		Total		p value
		f	%	f	%	f	%	
Age	20-35 years	20	71.4	28	100	68	81.0	0.100
	<20 and >35	8	28.6	0	0	16	19.0	
	Total	28	100	28	100	84	100	
Education	High School-High School	24	85.7	22	78.6	66	78.6	0.350
	Elementary-Middle School	4	14.3	6	21.4	18	21.4	
	Total	28	100	28	100	84	100	
Work	Work	12	42.9	10	35.7	38	45.2	0.419
	housewife	16	57.1	18	64.3	46	54.8	
	Total	28	100	28	100	84	100	
Income	≥UMR	18	64.3	15	53.6	18	56.0	0.127
	<UMR	10	35.7	13	46.4	10	44.0	
	Total	28	100	28	100	84	100	

The results of the homogeneity test on the characteristics of respondents obtained a p value > 0.05 so that it is considered to have homogeneous data variance, including age with a

value of 0.100, education with a value of 0.350, occupation with a value of 0.419, and income with a value of 0.127.

Table 2. Normality Test of Serum Ferritin Levels Before Treatment

Group	<i>Shapiro-Wilk</i>		
	Statistics	df	Sig.
Pumpkin Seed Capsules	0.895	28	0.009
Iron Supplement Tablets	0.760	28	0.001

The results of the normality test according to *the Shapiro-Wilk Test* obtained a significance value in the treatment group given pumpkin seed capsules of 0.009 and in the control group given iron tablets of 0.001. Both groups obtained values less than 0.05, so the research data is assumed to be distributed abnormally, thus, the data normality requirements are not met. Therefore, the next comparative test uses the *Wilcoxon* statistical test which is a non-parametric statistical analysis.

Table 3. Results of Analysis of Serum Ferritin Levels Before and After Treatment in the Group Given Pumpkin Seed Capsules and Iron Supplement Tablets at the Bangsal Mojokerto Community Health Center (n=28)

Variables	Group Pumpkin Seed Capsules	Group Iron Supplement Tablets
Serum Ferritin Level Before ($\mu\text{g/mL}$)		
Mean	62.13	45.35
Min	9.68	8.80
Max	148.96	147.28
Elementary School	45.42	42.84
Serum Ferritin Level After ($\mu\text{g/mL}$)		
Mean	66.10	46.89
Min	14.60	10.10
Max	151.72	149.30
Elementary School	43.98	42.94
Serum Ferritin Level Difference ($\mu\text{g/mL}$)	3.97	1.54
Serum Ferritin Levels Before – After		
ρ value	0.001	0.001
Serum Ferritin Levels between Groups		
	Pumpkin Seed Capsules and Iron Supplement Tablets	
ρ value	0.131	

The difference in the average increase in serum ferritin levels of pregnant women in the group given pumpkin seed capsules was $3.97\mu\text{g/mL}$, and in the group given supplementary tablets was $1.54\mu\text{g/mL}$.

The Wilcoxon test indicated a significant increase in ferritin levels within the pumpkin seed capsule group ($\rho < 0.05$). However, the Mann-Whitney test showed no significant difference in ferritin levels between the pumpkin seed capsule group and the blood supplement

tablet group ($p=0.131$).

Andugula Research Swapna Kumari, et al (2025) entitled *Pumpkin Seeds as a Natural Remedy for Anemia: Nutritional Insights and Therapeutic Potential* states that the socio-economic and health impacts of anemia highlight the need for effective prevention and management strategies. Dietary interventions play a crucial role in addressing iron deficiency, with functional foods gaining popularity due to their sustainability and potential economical cost. In between grains the, seed pumpkin (*Cucurbita*) stand out Because content nutrition Which rich and potential health benefits. This study explores the global prevalence of anemia in India and the complexities nutrition from condition the, as well as potential therapeutic seed pumpkin.

DISCUSSION

The results of this study align with a 2023 study by Kereh et al., which found that administering pumpkin seed capsules also increased hemoglobin levels. One effort to prevent anemia in adolescent girls is to utilize local plants found in the community as functional foods. Pumpkin is a potential source of pro-vitamin A and is a type of vegetable that can be used in various dishes. Education on the development of functional foods based on local foods is urgently needed to prevent various cases of disease and malnutrition in the community. The use of plants growing around homes needs to be encouraged in recipe modification efforts and for processing and consumption, either directly or through recipe engineering. (Karani and Oktafa, 2021).

The results of the research by Rufiah and Dewi (2019) showed that the p - value test was 0.037. There was a difference between the intervention group and the control group in increasing hemoglobin levels in pregnant women in the third trimester. Boiled pumpkin leaf shoots can be a non-pharmacological remedy for increasing hemoglobin levels if consumed regularly. (Maria and Devi, 2019).

Most anemia is caused by iron and folic acid deficiencies. Food sources rich in iron and folic acid are generally found in expensive animal proteins, which are not yet widely available. Although plant-based foods such as tempeh and tofu contain iron, the iron in these foods is difficult to absorb. If the food consumed daily does not contain enough iron and folic acid, or if absorption is low, the body's iron supply will not be sufficient to meet iron needs. (Rahmawati et al., 2021).

The administration of pumpkin seed capsules also increased serum ferritin levels. One effort to prevent anemia in adolescent girls is to utilize local plants as functional foods found around the community. Pumpkin is a potential source of provitamin A and is a type of vegetable that can be used in various dishes. Education on the development of functional foods based on local foods is urgently needed to prevent various cases of disease and malnutrition in the community. The use of plants growing around the home should be encouraged in recipe modification efforts and for processing and consumption, either directly or through recipe engineering. (Kereh et al., 2024).

One local food ingredient high in beta-carotene, vitamin A, fiber, vitamin C, and minerals is pumpkin. Pumpkin contains 1.4 mg/dl of iron per 100 grams. 12 The highest carbohydrate content in pumpkin is starch, and the nutritional value of protein from pumpkin flour itself is 7.83 grams. From the above description, it can be concluded that this intervention can affect the increase in hemoglobin levels in pregnant women. Research results are also influenced by the nutritional content of the food consumed by pregnant women. Iron is naturally obtained from food, which can come from animals or plants. The iron in spinach combined with the vitamin C content in guava is served in the form of a drink (juice), thus

helping the process of proper iron absorption. Iron will form hemoglobin and maintain red blood cells in pregnant women. Efforts to prevent anemia in pregnant women should be given iron tablets to ensure adequate iron needs for the fetus, especially brain and blood development. (Yulyana & Mizawati, 2019).

Research by Widyastuti et al. (2024) states that hemoglobin, erythrocyte, and hematocrit levels are interconnected components of red blood cells. In managing every process in the blood and maintaining normal levels, nutritional intake is required, especially iron, folic acid, protein, vitamin C, and zinc, which can play a role in the production and transportation of blood components throughout the body. Providing iron supplements can increase erythrocyte and hemoglobin levels in adolescent girls. The effect of administering iron (Fe) tablets on hematological profiles (hemoglobin, hematocrit, erythrocyte, and erythrocyte indices) in pregnant women is very significant. (Widyastuti, 2024).

The results of research by Nur Anisa, et al. (2019), stated that the process of iron absorption in the form of Ferri (Fe³⁺) or Ferro (Fe²⁺) initially occurs during the digestive process. In the intestine, Fe³⁺ dissolves in stomach acid and is then bound by gastroferrin and reduced to Fe²⁺. In the intestine, Fe²⁺ is oxidized to Fe³⁺, then binds to apoferritin which is then converted to ferritin, releasing Fe²⁺ into the blood plasma. Consuming Vitamin C will help the process of iron (Fe²⁺) absorption in the small intestine. In the plasma, Fe²⁺ will be bound by transferrin. Transferrin transports Fe²⁺ to the bone marrow to combine and form hemoglobin. (Nur Anisa, Sri Wahyuni, Sri Rahayu, Aulia Choirunnisa, Listyaning Eko Martanti 2019).

CONCLUSION

This study concludes that pumpkin seed capsules effectively increase serum ferritin levels in pregnant women with anemia. However, the effect was not significantly different from standard iron supplementation.

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