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Beetroot (*Beta Vulgaris L*) Juice on Hemoglobin Levels in Pregnancy

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Abstract:
Malnutrition, iron deficiency, malabsorption, and chronic illness are the direct causes of anemia. There was already a non-pharmacological treatment for anemia in pregnancy, such as eating green vegetables, beans, chicken liver, beetroot, and red guava fruit. Beets have one of the highest quantities of folic acid of any fruit, at 108 mg, compared to other fruits. The goal of this study was to see how beetroot juice (Beta vulgaris L) affected hemoglobin levels in anemic pregnant women at the Cibatu Health Center in Garut Regency. The approach is a quasi-experimental investigation. The population was made up of 234 pregnant women in their third trimester. Purposive sampling was used in this study, with 48 persons separated into the experimental and control groups. Observation sheets and Easy Touch GCHb were used as instruments. Paired T-test and Independent Samples Test were used to analyze the data. The results demonstrate that before being given beet juice, the average hemoglobin level in the experimental group was 9.09. After being given beetroot juice, it was 10,98 while in the control group. Observation sheets and Easy Touch GCHb were used as instruments. Paired T-test and Independent Samples Test were used to analyze the data. The results show that before being given beet juice, the average hemoglobin level in the experimental group was 9.09, and after being given beetroot juice was 10,98. In contrast, in the control group, the hemoglobin level of the first examination was 8.99, and the hemoglobin level of the second examination was 9.92. The p-value for the bivariate analysis between and within groups was 0.000 (0.05). It can be inferred that beetroot juice affects hemoglobin levels in anemic pregnant women. This finding is predicted to help boost hemoglobin levels in pregnant women who have anemia.

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INTRODUCTION

The global maternal mortality rate remains an issue that must be addressed. In 2015, an estimated 303.000 maternal fatalities occurred worldwide (World Health Organization,2015). Anemia during pregnancy is one of the causes of MMR. Although the frequency of anemia among pregnant women has decreased over time, it remains as high as 35% in Indonesia [Susanti et al., 2017]. Anemia occurs when the blood's hemoglobin (Hb) level is lower than usual. Anemia in pregnancy is characterized as hemoglobin levels in the mother being less than 11 g% in the first and third trimesters or less than 10.5 g% in the second trimester (Breymann, 2015). Anemia is one of the high-risk conditions in pregnancy due to disorders of the spinal cord in the formation of erythrocytes, resulting in bleeding. Anemic pregnant women have low hemoglobin levels ranging from 7-10.5 g%. So, only a little red blood is circulating to transfer oxygen in the body (El-Kholy et al., 2023; Quan et al., 2025).

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One of the most prevalent nutritional deficiencies in pregnancy is iron deficiency anemia, which is caused by the increased need for iron during pregnancy. During pregnancy, women usually experience many changes and various kinds of complaints. Therefore, they must pay attention and take good care of the fruit of their pregnancy. The process of pregnancy begins with the union of the egg and sperm cells, followed by division and implantation in the uterus. During pregnancy, many risk factors can cause complications in pregnant women, including anemia in pregnant women, bleeding, abnormal weight, and infection. One thing to be aware of during pregnancy is anemia in pregnancy (Rahmawati & Murtaqib, 2024; Banerjee et al., 2024; Novelia et al., 2023).

Iron deficiency is the primary cause of anemia in pregnant women worldwide. A poor diet causes iron insufficiency. Iron deficiency anemia can also be induced by family socioeconomic issues such as schooling and low iron levels. A lack of nutritional awareness might cause anemia during pregnancy. Anemia in pregnant women is usually caused by a lack of iron in the diet. Iron deficiency anemia is common because the need for iron is not increased during pregnancy. Pregnant women should eat iron-rich foods such as green vegetables, dry beans, dried fruit, and red beets (Ferasinta & Zulya, 2024; Van Cor et al., 2022).

The government's strategy to reduce the incidence of anemia by distributing 90 tablets of blood supplement during pregnancy at 60 mg is predicted to boost 1 g% per month. Non-pharmacological treatments for anemia include ingesting herbs such as moringa leaves and other fruits. According to one study, iron with orange extract can help anemic pregnant women improve their hemoglobin levels (Novelia et al., 2020). Furthermore, beetroot includes a variety of nutrients like folic acid, potassium, fiber, vitamin C, magnesium, iron, phosphorus, tryptophan, coumarin, and betacyanin. Beetroot has a decent amount of folic acid and iron, both of which are required in the body to create new red blood cells and Hemoglobin. The iron level is relatively high, which reactivates and regenerates red blood cells and supplies oxygen, which is beneficial to red blood cell health (Singh et al., 2022). Besides fruits, moringa leaves (Moringa Oleifera) were also herbal and could increase hemoglobin levels during pregnancy (Kundaryanti & Novelia, 2021).

According to the Garut District Health Office's annual report, the cases of anemia in pregnant women were 40% in 2015 and 24.52% in 2017, but this number remained relatively high, at 6,669 in 2019. In 2019, the prevalence of anemia in pregnant women was high (Garut District Health Office, 2021). According to the Cibatu Health Center's annual report, in 2021, 481 pregnant women out of 1,163 pregnant women, or approximately 41.4%, had anemia, one of the health centers that results in the high incidence of anemia in pregnant women in Garut Regency (Puskesmas Cibatu, 2021). This fact reflects that there is a need for pregnant women to increase their Hemoglobin at Cibatu Health Centre. This study aimed to determine the effect of beetroot juice (Beta vulgaris L) on hemoglobin levels of anemic pregnant women at the Cibatu Health Center, Garut Regency, in 2022.

METHOD

This study's quasi-experimental research methodology used a pretest-posttest design with a control group. The population consisted of 234 pregnant women in their third trimester who had anemia at the Cibatu Health Center's Work Area in the Garut Regency in June and July 2022. Forty-eight samples (20%) were taken purposively based on inclusion and exclusion criteria. The inclusion criteria are third-trimester pregnant women, willing to join the study, signing the informed consent, experiencing anemia (Hb= 7-10 gr/dl), and receiving routine care (Fe Tablets). The exclusion criteria are pregnant women who have complications and did not experience anemia (Hb>=11 gr/dl) and received routine care (Fe Tablets). Forty-eight pregnant women were selected randomly and divided into experimental and control groups. The researcher's homemade beetroot juice served as the

intervention. Beetroot juice was made using 200 grams of beetroot, 200 grams of peeled skin, and a blender. The juice was filtered after blending, put in plastic containers, and secured with elastic bands. Respondents (the experiment group) were given it to consume daily for 14 days while being examined. The researcher evaluated the control group respondents and ensured the hb levels of pregnant women. The instruments used in this study are observation sheets and Easy Touch GCHb. Data were analyzed univariately and bivariately with SPSS 25. The data obtained were standard, so it was continued with an independent t-test and paired sample t-test. This study has gained ethical clearance from the Health Research Ethics Committee of the Faculty of Medicine and Health Muhammadiyah University Jakarta (No. 223/PE/KE/FKK/UMJ/VIII/2022).

RESULT

Univariate Analysis

Table 1. Hb Levels Before and After Intervention in the Experiment Group

	Experiment Group					Mean Difference
	N	Min	Max	Mean	SD	
Pre-Test	24	7.8	10.5	9.09	0.80	1.89
Post-Test	24	9.8	12.3	10.98	0.83	

Table 1 shows that out of 24 respondents, the mean Hb of the pre-test is 9.09 gr/dl (SD=0.8). Out of 24 respondents, the Hb of the post-test is 10.9 gr/dl (SD=0.83). The mean difference between pre and post-test is 1.89.

Table 2. HB Levels Before and After Intervention in The Control Group

	Control Group					Mean Difference
	N	Min	Max	Mean	SD	
Pre-Test	24	7.2	10.3	8.99	1.05	0.94
Post-Test	24	8.4	11.3	9.92	1.00	

Table 2 shows that out of 24 respondents, the mean of Hb of the pre-test is 8.99 gr/dl (SD= 1.05). Out of 24 respondents, the Hb of the post-test is 9.92 gr/dl (SD=1). The mean difference between pre and post-test is 0.94.

Bivariate Analysis

Table 3. The Difference of Hb between the Experiment and Control Group after the Intervention

	Post-test			p-value	t
	N	Mean	SD		
Experiment Group	24	10.99	0.83	0.000	3.97
Control Group	24	9.93	1.01		

Table 3 shows a difference in Hb between the experiment and control group after intervention (p=0.000).

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Table 4. The Difference of Hb within Experiment Groups Before and After Intervention

	Experiment Group			p-value	t
	N	Mean	SD		
Pre-test	24	9.09	0.8	0.000	38.7
Post-test	24	10.98	0.83		

Table 4 shows a difference in Hb before and after intervention within the experiment group (p=0.000).

DISCUSSION

Based on the study's findings, pregnant women who were anemic had an increase in their average hemoglobin level both before and after receiving beetroot juice and Fe pills. According to bivariate research, taking Fe tablets and beetroot juice increased Hb levels more effectively than taking Fe tablets alone. Hemoglobin levels lower than 11 g% in the first and third trimesters or below 10 g% in the second trimester are considered anemia in pregnancy. Hemodilution, particularly in the second trimester, is the cause of this limited value and the difference between it and the state of non-pregnant women. The lack of or insufficient iron intake in vegetables, food, or supplements is the leading cause of iron deficiency anemia in pregnant women (Burayu and Degefa, 2024; Xu et al., 2022).

Since newborns require much iron to grow, iron insufficiency is a common problem for pregnant women. Anemia is also caused by a lack of consumption of foods that contain iron or by impaired absorption of iron in the body (Bó et al., 2022; Kebede et al., 2025). Pregnant women require twice as much iron as regular individuals do. This requirement starts during the second trimester as a result of hypovolemia, a physiological pregnancy adaption. A pregnant woman saves about 1000 mg of iron during pregnancy, including for the fetus's needs, placenta, and Hemoglobin. Fatigue, sluggishness, weakness, palpitations, nausea, a pale face, a weakened immune system, pale eyes, headaches, and fainting are the effects of low hemoglobin levels. Miscarriage (abortion), premature birth, immaturity, prolonged labor due to uterine inertia, impaired uterine contractions following delivery (uterine atony), shock, infection, both during and after delivery, and low birth weight babies are some even more profound effects that may occur (Garzon et al., 2020).

Beetroot, known as beetroot or red beet, is a type of plant from the Amaranthaceae group and has the Latin name Beta Vulgaris, which is very good for helping to overcome the problem of anemia (Moulick et al., 2023; Salman et al., 2024). Beetroot has historically been used for a variety of medical purposes, including the treatment of cough. It also possesses antioxidants, anti-depressants, anti-microbial, anti-inflammatory, anticarcinogenic, and immunomodulatory effects. It is a dietary supplement with many vitamins, minerals, amino acids, and vitamins, as well as certain phytoconstituents. It promotes baby growth throughout pregnancy (Singh et al., 2022). As a energy source for the body and an immune system booster, beetroot is also beneficial for preventing stroke, decreasing cholesterol, preventing heart disease, boosting the immune system, and treating infections and inflammation. Regular eating of beetroot is highly recommended. Beetroot has 108 mg of folic acid, 27.0 mg of calcium, 43.0 mg of phosphorus, 43 mg of vitamin C, 23 mg of magnesium, 9.6 mg of carbs, and 1.0 mg of iron in the list of food constituents. It can be concluded that beetroot may have some therapeutic effects for iron deficiency after ingesting 8 g of beetroot for 20 days was observed to cause an apparent increase in serum iron level, a slight increase in Hemoglobin, and a modest increase in ferritin (Al-aboud, 2018).

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This study supports the research of Risnawati et al. (2021) on the effects of beet juice on anemic pregnant women's hemoglobin levels based on studies done in the Tayu I Health Center's area of operation. The results found a difference in hemoglobin levels between the experimental group and the control group after intervention. According to a study by Zahrah and Setyaningsih (2019), administering 3.6 grams of beet juice per pound of body weight was just as effective as supplementing with 1.08 milligrams of iron per pound of body weight (Zakiyah & Setyaningsih, 2019). Additionally, supplementing pregnant women with anemia who took Fe pills for 14 days with 8 grams of beetroot powder could increase their hemoglobin and hematocrit levels and erythrocytes (Triana et al., 2020). Conclusion: Beetroot juice has been successfully used as a substitute product to treat anemia during pregnancy. Pregnant women are advised to consume beetroot as an all-natural, non-pharmacological method of treating and preventing anemia. The non-random sample selection is the study's flaw.

CONCLUSION

Beetroot juice has an effect on hemoglobin levels among anemic pregnant women. It is hoped that midwives could provide health education and that this intervention could increase hemoglobin levels during pregnancy. Pregnant women are recommended to consume beetroot juice since the first trimester of pregnancy in order to prevent anemia. Future research is recommended to explore this intervention by using a randomized control trial design.

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