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THE EFFECT OF GIVING BEETROOT PUDDING (BETA VULGARIS L) ON HEMOGLOBIN LEVELS IN ADOLESCENT GIRLS WITH ANEMIA AT THE PAOPALE DAYA POLINDES-MADURA

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ABSTRACT
Anemia is a condition where the number of red blood cells in the body is insufficient. Usually due to malnutrition (iron). Adolescent girls have a higher risk of experiencing anemia compared to adolescent boys because adolescent girls menstruate every month which puts them at risk of losing iron. Beetroot made into pudding can be a non pharmacological alternative in treating anemia. The purpose of this study was determine the effect of giving beetroot pudding on increasing hemoglobin levels in adolescent girls with anemia at the Paopale Daya-Madura health clinic. This tipe of research is quantitative, using a Quasi Experimental method with a one group pre test post test. The sampling technique in this study was Purposive sampling and obtained 30 respondents with anemia. The sample was obtained according to the inclusion by interview. The data analysis technique used T-Test paired samples. The result of this study showed that 24 out of 30 respondents (80 %) level experienced an increase hemoglobin levels. Before giving beetroot pudding, the lowest hemoglobin value was 9,9 g/dL, and the average value was 10,9 g/dL or 1.47. After giving beetroot pudding, the lowest hemoglobin result was 10,8 g/dL, and the average value wast 12,2 g/dL or 3.43. From the paired t-test, p=0,000 (p<0,05) was obtained with the conclusion that there is an effect of giving beetroot pudding on increasing hemoglobin levels. Giving beetroot pudding for 7 days every afternoon as much as 250 ml can be a non-medical alternative to increase hemoglobin levels in adolescent girls who are anemic due to iron deficiency.

Keywords: Adolescents Girls, Beetroot, Hemoglobin Levels

1. INTRODUCTION

Anemia is a condition in which the number of red blood cells in the body is insufficient to meet the body's physiological needs due to several factors, generally due to nutritional deficiencies (iron), which reaches 85.5%, characterized by impaired hemoglobin synthesis. Anemia, also known as lack of blood, remains a global health problem. According to the World Health Organization (WHO), 50 million people experience disabilities due to anemia (WHO, 2023). The global prevalence of anemia ranges from 40-80% according to the World Health Organization (WHO). In Indonesia, based on the results of the 2018 Riskedsas, the prevalence of anemia in adolescent girls aged 11-14 years was 26.8%, and 32% in those aged 15-24 years, meaning 3-4 out of 10 people experience anemia (Ministry of Health, 2022). Various impacts can be caused by adolescent girls due to anemia, such as impaired growth, decreased cognitive function, and immune system (Norris et al., 2022). The impact of low iron (Fe) status can cause anemia with symptoms of lethargy or fatigue, paleness,loss of appetite, and shortness of breath. Some impacts usually occur immediately in adolescent girls who complain of dizziness and blurred vision, pale lips, tongue, skin and palms, limp, tired, fatigue and long-term impacts because women will become pregnant and have children. During pregnancy, adolescents who experience anemia will experience more severe anemia because during pregnancy the need for nutrients is greater if not immediately treated it will have a negative impact on the mother and her baby (Apriyanti,2019).

Anemia can be treated using both pharmacological and non-pharmacological methods. Pharmacological methods include administering 60 mg elemental iron tablets and 0.25 mg folic acid, while non-pharmacological methods include beetroot. Several studies have shown that beetroot has health benefits, including purifying the blood, maximizing brain development in infants, acting as an anticancer agent, improving breathing, and treating anemia.

Beetroot (Beta Vulgaris) is a fruit often used as a natural food coloring and is rich folate, which is effective in preventing heart disease and anemia. According to the food ingredients list, beetroot contains 108 mg folic acid, 27.0 mg calcium, 43.0 mg phosphorus, 43 mg vitamin C, 23 mg magnesium, 9.6 mg carbohydrates, and 1.0 mg iron (Suzanna et al., 2022). Red beetroot contains compounds that can increase hemoglobin levels in the blood, including: iron, vitamin C, vitamin A, copper and phosphorus (Putri and Tjiptaningrum, 2016).

Pudding is a type of starch-based food prepared by boiling, steaming, and baking to produce a soft gel. Pudding starches can be made from agar (based on ingredients such as gum arabic, seaweed, and carrageenan), flour, or processed products such as bread, cake, and so on. Pudding can be served as a sweet dessert. Puddings are also made from eggs and starch, not always agar. Puddings made from milk (yogurt), cornstarch/cornflour, tapioca, or eggs are served chilled (Darmawan, 2014).

A survey conducted at the Paopale Daya Polindes in Madura found that 13 adolescents, 10 of whom suffered from anemia. From the interview results, 3 teenagers aged 12-14 years old do not like to eat vegetables, 2 teenagers aged 15-17 years old do not like to eat meat, and 5 teenagers aged 18-20 years old do not like to eat vegetables and meat. 10 teenagers who suffer from anemia do not like to take Fe tablets because they do not like taking medication, so that their iron needs are not met.

2. METHODS

The type of research used is quantitative. The research design is a design regarding the entire process required in the planning and implementation of research (Silaen, 2018). The method used in this study is a quasi- experimental with a research design used is a one-group pre-test post-test design. Researchers measured the level of Hb levels in adolescents before being given beetroot pudding (pre-test) and after being given beetroot pudding (post-test), so that differences in the results of Hb level measurements can be found before and after treatment. Beetrot pudding is given once a day as much as 250 ml for 1 week every afternoon after school. After 1 week, respondents will have their hemoglobin levels measured. Betroot pudding is made by themselves. The population of this study was all 33 female adolescents with anemia. The sampling technique used was purposive sampling. The samples used were those that met the invlusion and exclusion criteria.

Inclusion criteria: Female adolescents who are willing to be respondents, female adolescents who do not consume Fe tablets, and female adolescents who during the study did not consume foods containing high Fe for 7 days. Exclusion criteria: Adolescent girls who withdrew at any time during the study, Adolescent girls who were not present during the study. The study location was at the Paopale Daya-Madura Village Health Center. The study was conducted in January-February 2025.

3. RESULTS

Frequency Distribution of Respondent Characteristics Based on Age of Adolescent Girls at Polindes Paopale Daya-Madura

Age	Frequency	Precentage (%)
11-14 Years	2	6.7
15-17 Years	13	43.3
18-21 Years	15	50.0
Total	30	100.0

Based on table it shows that half of the respondents are aged 18-21 years, namely 15 respondents (50%).

Frequency Distribution of Respondent Characteristics Based on Occupation

Occupation	Frequency	Precentage (%)
Working	12	40,0
Not Working	18	60,0
Total	30	100.0

Table that the majority of respondents, 18 respondents (60%), are unemployed.

Frequency Distribution of Respondent Characteristics Based on Education Level

Education Level	Frequency	Precentage (%)
Elementary School	2	6,7
Middle School	17	56,6
High School	11	36,7
College	0	0,0
Total	30	100.0

Based on table it shows that half of the respondents had junior high school education, namely 17 respondents (56.6%).

Hemoglobin Levels in Adolescent Girls Before Beetroot Pudding at the Village Health Center Paopale Daya-Madura

Hemoglobin Levels	Frequency	Precentage (%)
Mild Anemia	5	16,7 %
Moderate Anemia	1	3,3 %
Severe Anemia	0	0 %
Non Anemic	24	80 %
Total	30	100.0

The results of the study showed that before being given beetroot pudding, most respondents experienced mild anemia before being given beetroot pudding, namely 16 people (53.3%), almost all respondents.

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Moderate Anemia	1	3,3 %
Severe Anemia	0	0 %
Non Anemic	24	80 %
Total	30	100.0

The results of the study showed that almost all respondents after being given beetroot pudding were no longer anemic, namely 24 people (80%).

Statistical Test Results

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	1.47	30	.507	.093
	Posttest	3.43	30	1.165	.213

Based on table, the results of the paired sample statistics test showed a difference in the average hemoglobin level before giving beetroot pudding of 1.43 and the average hemoglobin level after giving beetroot pudding of 3.43.

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Pretest - Posttest	-1.967	1.189	.217	-2.410	-1.523	-9.063	29	.000

Based on the results of 4.17 sig (2-tailed)= 0.000. P value < 0.05 means Ho is rejected and Ha is accepted, so there is a difference in hemoglobin levels before and after giving beetroot pudding.

4. DISCUSSION

Hemoglobin Levels Before Beetroot Pudding

The study results, by age, showed that nearly half of respondents aged 18-21 years old experienced moderate anemia before receiving beetroot pudding (8 people (26.7%), and across all ages, more than half of respondents experienced mild anemia (16 people (53.3%). This is in line with research by Nurrahmaton et al. (2022), which found that the most anemia-prone adolescents were aged 14-16 years. In the study, the majority of the 15 respondents were aged 15-17 years. Adolescence experiences continuous physical, biological, and psychological changes (Nuradhiani et al., 2018).

Several conditions that contribute to anemia in adolescents include insufficient consumption of iron-rich foods such as red meat and chicken liver; insufficient consumption of foods that support iron absorption (foods containing Vitamin C such as oranges and guava); consumption of foods or beverages containing phytate and tannins such as tea and coffee; significant blood loss during menstruation; and genetic disorders such as thalassemia. (Herwinda, 2022). The study's findings, based on

occupation, showed that nearly 10 respondents (33.3%) who were unemployed before receiving beetroot pudding experienced mild anemia, and more than half of the respondents (53.3%) experienced mild anemia based on occupation. The study's findings, based on education level, showed that nearly half of the respondents (30%) with junior high school education experienced mild anemia, and more than half of the responden (53.3%) with all levels of education experienced mild anemia.

This is in line with research by Blaney et al. (2015) that found that adolescent girls with an education below high school level were highly susceptible to anemia, at around 57.3%. Children with elementary and junior high school education experienced symptoms of anemia. Nutrition education has been found to be very effective in changing adolescent girls' attitudes and knowledge about food. Several conditions that cause anemia in adolescents include insufficient consumption of iron-rich foods such as red meat and chicken liver; insufficient consumption of foods that support iron absorption, such as sources of vitamin C such as oranges and guava; consumption of foods or drinks containing phytates and tannins, such as tea and coffee; significant blood loss during menstruation; and genetic disorders such as thalassemia (Herwinda, 2022). The results of the study showed that before the beetroot pudding was given, the lowest hemoglobin value was 9.9 g/dL, the highest value was 11.9 g/dL, and the average value was 10.9 g/dL.

According to the researcher, most respondents were aged 15-17 years with a junior high school education and most were unemployed, which can trigger anemia because they already have many activities at school. Consuming foods that do not contain iron and vitamin C, which can help iron absorption, and blood loss during menstruation exacerbate anemia. The lower a person's education level, the lower their ability to maintain and improve their health.

Hemoglobin Levels After Beetroot Pudding

After beetroot pudding, the hemoglobin levels of all respondents aged 18-21 (50%) were no longer anemic, and nearly all respondents (80%) were no longer anemic by age. After beetroot pudding, nearly half of the respondents (13 respondents (43.3%) who were unemployed became no longer anemic, and nearly all respondents (80%) who were no longer anemic by occupation became no longer anemic after beetroot pudding. After beetroot pudding, nearly half of the respondents (14 respondents (46.7%) who were no longer anemic by occupation became no longer anemic, and nearly all respondents (80%) who were no longer anemic experienced an increase in hemoglobin levels after beetroot pudding.

Anemia can be treated pharmacologically by administering 60 mg elemental iron tablets and 0.25 mg folic acid, or non-pharmacologically by administering beetroot.

Beetroot (Beta Vulgaris) is a fruit often used as a natural food coloring. It is rich in folate, which is effective in preventing heart disease and anemia. According to the Nutrition Facts List, beetroot contains 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 carbohydrates, and 1.0 mg of iron (Suzanna et al., 2022).

Red beets contain beneficial substances such as 34% folic acid, which helps grow and replace damaged cells; 14% potassium, which helps maintain fluid

balance in the body; 13.6% fiber; 10.2% vitamin C, which helps grow tissue and improve blood circulation; 9.8% magnesium, which maintains muscle and nerve function; 7.4% iron, which helps with energy metabolism and immunity; 6.5% copper, which helps prevent tumors and cancer; and 1.4% tryptophan (Dedefwin, 2021).

Research results showed that hemoglobin levels after beetroot pudding were as low as 10.8 g/dL, as high as 13.5 g/dL, and as an average of 12.2 g/dL. In the researcher's opinion, counseling with non-pharmacological therapies, such as consuming foods rich in iron and vitamin C, can help prevent anemia in adolescents and offer an alternative for adolescents who are reluctant to take iron tablets due to their potential side effects, which can cause nausea. Beetroot pudding is an innovation as an alternative treatment to increase hemoglobin levels.

The Effect of Giving Beetroot Pudding On Hemoglobin Levels

The results of the study showed that before being given beetroot pudding, most respondents experienced mild anemia before being given beetroot pudding, namely 16 people (53.3%), almost all respondents after being given beetroot pudding were no longer anemic, namely 24 people (80%). Based on a paired t-test, a P value of 0.000 <0.05 was obtained, indicating a difference before and after the administration of beetroot pudding to adolescent girls at the Paopale Daya-Madura Health Center. Beetroot contains compounds that can increase blood hemoglobin levels, including iron, vitamin C, vitamin A, copper, and phosphorus (Putri and Tjiptaningrum, 2016).

The results of this study showed that 24 (80%) adolescent girls experienced increased Hb levels, consistent with the theory that beetroot pudding can increase Hb levels because beetroot contains iron and folic acid, which help form red blood cells. Vitamins A and C, as well as phosphorus, increase iron absorption and aid in iron mobilization. Vitamin B-6, which produces red blood cells, is also important.

Pudding was administered every afternoon for 7 days, with 250 ml of beetroot pudding given to 30 adolescents. A paired t-test revealed an average hemoglobin level of 12.2 g/dL, compared to a minimum hemoglobin level of 10.9 g/dL before beetroot juice administration. The average anemia level before pudding administration was 1.47 and after beetroot pudding administration was 3.43. According to the researcher, the five students who did not experience an increase in hemoglobin levels were likely due to beetroot's lack of vitamin B-12. One classification of anemia is B-12 deficiency, or pernicious anemia. This anemia is accompanied by brain disorders, abnormal fatty acids, and altered tissue position.

5. CONCLUSION

Most respondents (16 respondents) had mild anemia before receiving beetroot pudding. Nearly all respondents (80%) were anemic after receiving beetroot pudding. Beetroot pudding significantly increased Hemoglobin levels in adolescent girls at the Paopale Daya-Madura Village Health Center (Polindes Paopale Daya, Madura), with a 2- tailed sig. 0.000, with a p-value <0.05.

Giving beetroot pudding for 7 days every afternoon as much as 250 ml can be a non-medical alternative to icrease hemoglobin levels in adolescent girls who are anemic due to iron deficiency.

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