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OPTIMIZING HEMOGLOBIN LEVELS IN ANEMIC ADOLESCENT GIRLS: A COMPARATIVE STUDY OF GREEN BEAN AND RED BEAN PORRIDGE SUPPLEMENTATION

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ABSTRACT

Anemia is a serious health problem in Indonesia, with a prevalence rate reaching 23.7%, higher in females compared to males. The prevalence of anemia in females even reached 27.2% in 2018, while in males it was 20.3%. Nutrient contents such as vitamin A, calcium, and potassium in green and red beans are believed to increase hemoglobin levels in the body. Therefore, this study aims to evaluate the effectiveness of providing green and red bean porridge in increasing hemoglobin levels in adolescent girls suffering from anemia at SMK PUSPA BANGSA BANYUWANGI. In this study, a quasi-experimental design with the randomized pre-test-post-test control group design approach was used. Out of 40 respondents receiving treatment, 20 respondents were given green bean porridge and 20 respondents were given red bean porridge, each with a dose of 200cc for 14 days. The results of the analysis showed that both types of porridge were effective in increasing hemoglobin levels in adolescent girls with anemia, as evidenced by the Paired T-Test with a P value of 0.000, which is smaller than α (0.05). Thus, it can be concluded that green and red bean porridge can be an effective alternative to increase hemoglobin levels in anemic adolescent girls at SMK PUSPA BANGSA BANYUWANGI.

Keywords

Anemia, Green and red bean porridge, Hemoglobin levels

INTRODUCTION

The prevalent nutritional issues in Indonesia primarily revolve around two main concerns: iron-deficiency anemia (IDA) and obesity, as well as vitamin A deficiency (VAD). Iron-deficiency anemia (IDA) often emerges as a problem during adolescence. Anemia is a condition characterized by a deficiency of red blood cells responsible for transporting oxygen throughout the body. In adolescents, anemia occurs when hemoglobin levels fall below 11 g/dl for females and 13 g/dl for males (Muhamad et al., 2020).

According to the World Health Organization (WHO) in the Worldwide Prevalence of Anemia report, over 1.62 billion people worldwide suffer from anemia, with the highest prevalence occurring among preschool-age children, school-age children, women of childbearing age, and men. The majority of anemia cases are concentrated in tropical

regions (Suryani et al., 2015; Budiarti et al., 2021).

In Indonesia, the primary nutritional issue is anemia, predominantly experienced by adolescents. Data from the 2013 Basic Health Research (Riskesdas) indicates a prevalence of anemia in Indonesia at 21.7%, which increased to 23.7% according to the 2018 Riskesdas. The prevalence of anemia among females is significantly higher than males, reaching 27.2% for females and 20.3% for males in 2018 (Ministry of Health Indonesia, 2018).

Anemia arises from the increased demand for iron during growth, especially among adolescent girls experiencing monthly menstruation. The consequences of anemia in adolescents include disrupted growth and development and increased susceptibility to infections due to a weakened immune system (Yunita et al., 2020; Dhital, 2021).

To boost hemoglobin levels in the body, one can consume supplements or foods rich in iron, folate, and vitamin C. One such food that aids in increasing hemoglobin levels is green beans and red beans. Green beans, rich in nutrients such as iron, calcium, vitamin B, vitamin A, and vitamin C, can help boost hemoglobin levels in the body (F. Putri & Nasution, 2019). The presence of vitamin A and vitamin C in green beans also aids in iron absorption in the body (Faridah & Verani, 2017; Chaurasia, 2020).

A study by Carolin (2021) at SMP Negeri 3 Bandar Lampung demonstrated that green bean extract can increase students' hemoglobin levels after consumption for 14 days, with an average increase of 1.14 g/dl. Meanwhile, besides being delicious, red beans are also rich in iron, phosphorus, calcium, fiber, potassium, and other nutrients, which can help increase hemoglobin levels in the body (Huda & Palupi, 2015; Marie et al., 2021).

Research by Fitri (2022) indicates that consuming red bean juice once daily, 30 minutes before meals, can increase hemoglobin levels in adolescents, with the average hemoglobin level rising from 11.63 g/dl to 13.160 g/dl after the intervention.

The correlation between iron and hemoglobin levels in green beans and red beans has sparked interest among researchers to conduct a study on the "Effectiveness of Green Bean and Red Bean Consumption in Increasing Hemoglobin Levels in Anemic Adolescent Girls."

METHOD

The study employs a quasi-experimental design with a randomized pre-test-post-test control group setup, comprising randomly selected green bean and red bean treatment groups. Pre-tests and post-tests are conducted to compare the effects of the treatments. The population includes 40 adolescent girls with anemia from SMK PUSPA BANGSA BANYUWANGI out of 240 students, sampled purposively based on Hidayat's formula. Inclusion criteria involve girls with hemoglobin levels < 12 g/dl, willing to participate, and not menstruating or taking iron supplements. Exclusion criteria include illnesses like bleeding, malaria, dengue fever, and typhoid. The study occurs at SMK PUSPA BANGSA BANYUWANGI from January 10 to 24, 2024. The independent variables are the provision of green beans and red beans, while the dependent variable is the increase in hemoglobin levels. Data collection methods include interviews, health examinations, and hemoglobin assessments using Easy Touch GCHB. SPSS version 17.0 is used for data analysis, employing univariate and bivariate analyses, with a paired T-test for hemoglobin level comparisons before and after intervention at a significance level of 0.05.

RESULTS

Table 1 Characteristics Based on Respondents' Age

Age	Green Bean Porridge Provision	Age	Red Bean Porridge Provision
16	9	16	7
17	8	17	9
18	3	18	4
Total	**20**	**Total**	**20**

Source: Primary Data

Based on Table 1, it can be observed that the majority of respondents in the group consuming green bean porridge are 16 years old, with 9 students (45.0%). Meanwhile, the majority of the group consuming red bean porridge are 17 years old, with a total of 9 students (45.0%). For the group receiving green bean porridge, the number of 18-year-old female students is 3 (15.0%), while for the group receiving red bean porridge, the number of 18-year-old female students is 4 (20.0%).

Table 2. Distribution of Hemoglobin Levels Before and After Green Bean Porridge Consumption

Green Bean Porridge Provision			
Name	**Age**	**HB Before**	**HB After**
Nn. A	16	10	10.5
Nn. C	17	11.2	12
Nn. X	17	11	12
Nn. W	16	9.9	11
Nn. Vi	18	9.2	10.8
Nn. Y	16	10.5	11.3
Nn. K	16	10.8	12
Nn.S	17	11	12.2
Nn.Va	16	11.1	12.3
Nn. Di	18	9.8	10.5
Nn. L	17	10.9	11.6
Nn. E	16	11.1	12.3
Nn. U	16	10.5	11.5
Nn. I	17	10	12
Nn. O	17	9.8	11.1
Nn. An	18	10.4	11.7
Nn. R	16	9.5	12
Nn. Z	17	10.8	12.2
Nn. M	16	9	10.8
Nn. Du	17	11.7	12.7

Source: Primary Data

Based on Table 2, it can be observed that the hemoglobin level measurements before the consumption of green bean porridge ranged from a minimum of 9.0 g/dl to a maximum of 11.7 g/dl. After consuming green bean porridge, the hemoglobin level measurements ranged from a minimum of 10.5 g/dl to a maximum of 12.7 g/dl. There were 20 individuals measured before the consumption of green bean porridge, with two individuals (10.0%) having the highest hemoglobin levels, ranging from 9.8 g/dl to 11.1 g/dl. Meanwhile, after the consumption of green bean porridge, there were five individuals (25.0%) with the highest hemoglobin level recorded at 12.0 Mg/dl.

Table 3 Distribution of Hemoglobin Levels Before and After Red Bean Porridge Consumption

Red Bean Porridge Provision			
Name	**Age**	**HB Before**	**HB After**
Nn. L	17	10.0	11.2
Nn. H	18	9.7	10.5
Nn. J	16	11.2	13.0
Nn. A	16	10.2	13.0
Nn. K	17	10.0	11.5
Nn. M	16	10.8	12.5
Nn. L	16	9.8	11.0
Nn. Z	17	9.1	10.2
Nn. N	17	9.7	11.1
Nn. C	17	9.7	10.2
Nn. W	16	10.0	10.5
Nn. U	18	10.2	11.5
Nn. E	18	9.8	11.0
Nn. S	17	11.0	11.5
Nn. D	16	10.4	12.5
Nn. Za	17	9.9	12.0
Nn. B	17	10.0	11.0
Nn. T	16	10.1	12.0
Nn. Y	18	10.5	13.0
Nn. I	17	8.9	12.0

Source: Primary Data

Based on Table 3, it can be observed that the results of hemoglobin level measurements before consuming red bean porridge show a minimum hemoglobin level of 8.9 g/dl and a maximum of 11.2 g/dl. After consuming red bean porridge, the results of hemoglobin level measurements show a minimum hemoglobin

level of 10.2 g/dl and a maximum of 13.0 g/dl. A total of 20 individuals were measured before consuming red bean porridge, with four individuals (20.0%) having the highest hemoglobin level at 10.0 g/dl.

Table 4. The Results of Normality Test for Hemoglobin Data Before and After the Provision of Green Bean Porridge and Red Bean Porridge

Category	Shapiro-Wilk		
	Stastisik	Df	Sig
Hemoglobin Before the Provision of Green Bean Porridge	.960	20	.537
Hemoglobin After the Provision of Green Bean Porridge	.929	20	.148
Hemoglobin Before the Provision of Red Bean Porridge	.954	20	.429
Hemoglobin After the Provision of Red Bean Porridge	.936	20	.203

Source: Primary Data

Based on Table 4, the research results indicate that before and after the provision of green bean and red bean porridge, the Shapiro-Wilk test results show that the hemoglobin data meet the normality requirement because the p-value for hemoglobin levels before and after the provision of green bean porridge (0.537, 0.148) > α0.05. Furthermore, for hemoglobin levels before and after the provision of red bean porridge, the sig value (0.429, 0.203) > α 0.05. Therefore, it can be concluded that the data distribution is normal, and the analysis will proceed using the Paired T Test.

Table 5.
Result of the Paired T Test on the Effectiveness of Green Bean Porridge and Red Bean Porridge Administration on Hemoglobin Levels

Kadar Hemoglobin	N	Mean	Median (Min-Mak)	*P-value*
Hemoglobin Before the Provision of Green Bean Porridge	20	10.41	10.5 (9.0 - 11.7)	0.000
Hemoglobin After the Provision of Green Bean Porridge		11.62	11.8 (10.5 – 12.7)	
Hemoglobin Before the Provision of Red Bean Porridge	20	10.05	10.0 (8.9 – 11.2)	0.000
Hemoglobin After the Provision of Red Bean Porridge		11.56	11.5 (10.2 - 13.0)	

Source: Paired T-Test

From the findings presented in Table 5, it can be concluded that before consuming green bean porridge, the hemoglobin level had a minimum value of 9.0 g/dl, whereas after consuming green bean porridge, the hemoglobin level reached a maximum value of 12.7 g/dl. Through the Paired T-test on subjects consuming green bean porridge, a p-value of 0.000 was obtained, which is greater than α 0.05, indicating a significant effect before and after the administration of green bean porridge on the increase in hemoglobin levels in female adolescents at SMK PUSPA BANGSA BANYUWANGI. Similarly, the results of the Paired T-test on subjects before the administration of red bean porridge showed a minimum hemoglobin level of 8.9 mg/dl, while after consuming red bean porridge, the hemoglobin level reached a maximum value of 13.0 g/dl. With a p-value of 0.000 greater than

α 0.05, these results indicate a significant effect before and after the administration of red bean porridge on increasing hemoglobin levels in anemia patients.

DISCUSSION

The results of the measurements before and after the treatment show that the hemoglobin levels before the administration of green bean porridge and red bean porridge had a minimum value of 9.0 g/dl and 8.9 g/dl, respectively. The maximum values were 11.7 g/dl and 11.2 g/dl for green bean porridge and red bean porridge, respectively. The average hemoglobin levels were 10.5 g/dl and 10.0 g/dl for green bean porridge and red bean porridge, respectively, indicating low hemoglobin levels among female students at.

These findings align with a study by Tataan et al. (2022), titled "The Effect of Green Bean Extract on Increasing Hemoglobin Levels in Female Adolescents at SMA Negeri 1 Gedong Tataan, Pesawaran Regency, 2022." According to the research, the average hemoglobin level among female students before the administration of green bean extract at SMA Negeri 1 Gedong Tataan was 10.67 g/dl, while after administration, it increased to 14.04 g/dl. This indicates a significant effect of green bean extract on increasing hemoglobin levels among female students at SMA Negeri 1 Gedong Tataan, Pesawaran Regency, in 2022, with a p-value of 0.000.

Similarly, the results align with a study by Bakara et al. (2022), titled "The Effectiveness of Red Bean Products in Increasing Hemoglobin Levels in Anemic Pregnant Women." Efforts to prevent anemia include providing iron supplements. However, the study emphasizes the importance of dietary iron intake, particularly from sources like red beans, which are rich in iron, zinc, copper, omega-3, and omega-6 fatty acids, contributing to the development of red blood cells and brain health in fetuses (Sartika & Ringo, 2023).

After the administration of green bean porridge and red bean porridge, there was an increase in hemoglobin levels among female students at SMK PUSPA BANGSA BANYUWANGI. The hemoglobin levels after consuming green bean porridge ranged from 10.5 g/dl to 12.7 g/dl, with an average of 11.8 g/dl. Similarly, after consuming red bean porridge, the hemoglobin levels ranged from 10.2 g/dl to 13.0 g/dl, with an average of 11.5 g/dl.

These results are consistent with Fitri, Susilowati, Kurniarum, et al.'s (2022) study titled "The Effect of Red Bean Juice Consumption on Hemoglobin Levels in Female Adolescents at Pondok Pesantren Nurul Quran, Kokap Subdistrict, Kulon Progo Regency, Yogyakarta Special Region." The research found a significant difference in hemoglobin levels among female adolescents after consuming red bean juice, with a p-value of 0.001. This indicates a significant increase in hemoglobin levels among female adolescents who consumed red bean juice.

CONCLUSIONS

From the results of this study, it can be concluded that the provision of green bean porridge and red bean porridge significantly increases hemoglobin levels in female students at SMK PUSPA BANGSA BANYUWANGI. Before the treatment, hemoglobin levels were generally low, but after consuming both types of porridge, there was a significant increase in hemoglobin levels. These findings are consistent with previous research highlighting the benefits of consuming green beans and red beans in increasing hemoglobin levels, especially in groups of adolescent girls and pregnant women. This indicates the potential use of natural food sources such as green beans and red beans as an effective strategy in addressing anemia issues.

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