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Effect of red bean consumption on hemoglobin levels in female adolescents with anemia

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ABSTRACT

Anemia occurs due to the condition of micronutrient iron (Fe) deficiency which is not only a problem for Indonesia but also experienced by many countries in Asia. The incidence of anemia in Indonesia is still quite high. Based on the 2018 Riskesdas data, the prevalence of anemia in adolescents is 32%, meaning that 3-4 out of 10 adolescents suffer from anemia. This is influenced by nutritional intake habits that are not optimal and lack of physical activity. Red beans have a content that can overcome anemia, namely iron (Fe). The iron content in red beans can help control the amount of hemoglobin in the blood. This study aims to determine the effect of red beans on hemoglobin levels in female adolescents with anemia. Experimental research design with a control group. The sample in this study were female students with Hb levels < 12 gr/dl totaling 56 people consisting of 28 experimental groups and 28 control groups. The results of the study obtained a p value of 0.004 which indicates the effect of red beans on hemoglobin levels in female adolescents. Consumption of red beans which are rich in iron can meet the needs of iron in the body which functions to form hemoglobin and prevent anemia. Suggestion: it is hoped that female adolescents can prevent anemia by consuming red beans.

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INTRODUCTION

Anemia is one of the three burdens of nutritional problems in Indonesia besides malnutrition and obesity. Anemia occurs due to the condition of micronutrient iron (Fe) deficiency which is not only a problem for Indonesia but also experienced by many countries in Asia (DeLoughery, 2017).

Anemia causes sufferers to experience fatigue, fatigue and lethargy so that it will have an impact on their creativity and productivity. Not only that, anemia also increases disease susceptibility as adults and gives birth to a generation with nutritional problems (Chaparro & Suchdev, 2019).

Anemia is prone to occur in adolescents, especially young women who have experienced menstruation (Schreir SL, 2018). The incidence of anemia in Indonesia is still quite high. Based on

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the 2018 Riskesdas data, the prevalence of anemia in adolescents is 32%, meaning that 3-4 out of 10 adolescents suffer from anemia. This is influenced by nutritional intake habits that are not optimal and lack of physical activity (Ministry of Health, 2023).

Anemia that often occurs is iron deficiency anemia. Iron deficiency is most common in women during menstruation, especially if they are classified as having heavy menstruation (Sholicha & Muniroh, 2019). Even though iron is important for maintaining the red color in the blood and also maintaining the functions of the organs in the body to keep working optimally (*World Health Organizatio1*, 2016). Iron is the main ingredient used in making red blood cells, it will make hemoglobin the substance that allows red blood cells to carry oxygen to the tissues in the body (*Suchdev PS*, 2015).

Acting Director General of Public Health at the Ministry of Health, Kartini Rustandi, revealed that anemia in young women is caused by an unhealthy lifestyle. Referring to the 2018 Riskesdas, around 65% of teenagers did not have breakfast, 97% consumed less vegetables and fruit, lacked physical activity and consumed excessive sugar, salt and fat (GGL) (Rahayuni et al., 2020).

The Ministry of Health has carried out specific interventions by administering Blood Supplement Tablets (TTD) to teenage girls and pregnant women(Kusumah et al., 2020). In addition, the Ministry of Health also tackles anemia through education and promotion of balanced nutrition, iron fortification in foodstuffs and implementing clean and healthy living (Ministry of Health, 2023).

Anemia can be overcome by means of pharmacological therapy and non-pharmacological therapy (Sunuwar et al., 2019). Pharmacological therapy to overcome anemia is by consuming blood booster tablets or Fe tablets while non-pharmacological therapy to overcome anemia is to consume foods that are high in iron content (Piskin et al., 2022). Foods that contain lots of iron are chicken, dried fruits, egg yolks, lean meat, spinach, liver, and beans. Nuts that contain lots of iron include soybeans, green beans and red beans. Red beans have a content that can overcome anemia, namely iron (Fe) (Tabesh et al., 2013). The iron content in red beans can help control the amount of hemoglobin in the blood (Kusumah et al., 2020).

The common bean (Phaseolus vulgaris L), provides significant quantities of protein and energy and is a source of vitamins and minerals including Fe (United States Department of Agriculture, 1996). The common bean is an attractive candidate for Fe biofortification because there is genetic variability of Fe concentration and therefore it is possible to breed for significant increases in Fe concentrations in beans. Also, Fe concentrations in beans are high relative to the cereals and therefore beans can deliver substantial increased amounts of Fe. Bean genotypes with high Fe concentrations delivered more absorbed Fe to rats than genotypes with lower concentrations of Fe (Manonmani et al., 2014).

The results of Wahyuni et al's research showed that all (100%) experienced mild anemia before treatment, after treatment, the results of all respondents (100%) changed to not anemia. Based on statistical results using the Wilcoxon test, $p = 0.005 < \alpha\ 0.05$, then H_0 is rejected and H_1 is accepted, where meaning that there is an effect of boiled red beans (Phaseolus vulgaris L) on hemoglobin levels in adolescents Institute of Health Sciences (STRADA), Kediri. It can be concluded that boiled red beans (Phaseolus vulgaris L) Contains iron, which is useful for increasing hemoglobin levels in the blood. It is recommended to respondents to use it boiled red beans as food to prevent anemia (Wahyuni et al., 2020).

The results of Bakara et al.'s research show that P value = 0.013 <0.05. This shows the effectiveness of processed red beans increase in hemoglobin in anemic pregnant women at the Malanu Sorong Health Center City. The conclusion of this study is processed red beans can increase hemoglobin (Bakara, 2022).

RESEARCH METHOD

The research design used is uantitative research using experimental research methods with a pretest-posttest design with control group design. In this study the experimental group was the group that was given treatment, namely giving red beans as much as 200 grams per day for 3 weeks which can be processed into soup, fresh drinks, and others. While the control group is the group that was not given any treatment. The population of this study were all class IX students at Senior High School Negeri 3 Rambutan. The sample in this study were female students with Hb levels < 12 gr/dl totaling 56 people consisting of 28 experimental groups and 28 control groups. The sampling technique used purposive sampling with the following inclusion criteria: not currently taking iron tablets, already menstruating and do not have blood disorders.

The data used in this study is primary data, namely data obtained directly from the respondents. The data includes hemoglobin levels before and after the intervention. The data collection instrument used was an observation sheet containing data on hemoglobin levels before and after the intervention in the experimental group and the control group. The research was conducted in April-June 2023. Data analysis used univariate and bivariate analysis. Univariate analysis used a homogeneity test to see the similarity of the characteristics of the respondents between the experimental group and the control group. Bivariate analysis used paired sample t test and Mann Whitney non-parametric test.

RESULTS AND DISCUSSIONS

The research was conducted on 28 young female respondents. Hemoglobin levels were measured using a digital device before and after consumption of red beans. The research results are presented in the following table

Table 1. Hemoglobin Levels Before and After Consumption of Red Beans

Intervention	Mean	SD	Min	Max	p value
Before	3.0234	0.410	1	3	0.002
After	3.2212	0.475	2	4	0.003

Based on table 1, the results of hemoglobin levels before and after consuming red beans for three weeks, the mean value of hemoglobin before the intervention was 3.0234 and the mean value of hemoglobin after the intervention was 3.2212. This value indicates an increase in hemoglobin levels after consuming red beans.

Table 2. Results of Mann Whitney Non-Parametric Test Differences in Hemoglobin Levels Before and After Red Bean Consumption

Group	N	Mean Rank	Sum of Rank	Z	ρ
Experiment	28	13.83	189.00		
				-2.293	0.004
Control	28	10.07	146.00		

Based on table 2, the results show that there is an effect of red bean consumption on hemoglobin levels in young women with a p value of 0.004

Discussion

Research that has been conducted on female adolescents who experience anemia and are given red bean consumption interventions shows that there is a change in hemoglobin levels after consuming red beans regularly for 3 weeks. The mean value of hemoglobin before the intervention was 3.0234 and the mean value of hemoglobin after the intervention was 3.2212. This value indicates an increase in hemoglobin levels after consuming red beans.

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The results of this study are supported by Wahyuni et al. The results of all respondents (100%) changed to no anemia. Based on statistical results using the Wilcoxon test, p = 0.005 < α 0.05, then H0 is rejected and H1 is accepted, where meaning that there is an effect of boiled red beans (Phaseolus vulgaris L) on hemoglobin levels in adolescents Institute of Health Sciences (STRADA), Kediri. It can be concluded that boiled red beans (Phaseolus vulgaris L) Contains iron, which is useful for increasing hemoglobin levels in the blood. It is recommended to respondents to use boiled red beans as food to prevent anemia.

Kidney beans are good sources of important nutrients with 22.7% protein, 3.5% mineral matter, 1% fat, 5.1% crude fiber, and 57.7% total carbohydrates. Red kidney beans have low sodium content and saturated fatty. Red beans are a type of legume that is rich in nutrients. Besides containing protein and a source of energy, red beans are a natural source of Fe which can significantly increase hemoglobin levels in the blood.

Iron is needed in the body for the formation of red blood cells so that it can prevent anemia. The body needs iron to carry out various functions, from blood circulation to infection prevention. Women are more susceptible to iron loss so their needs are greater, namely 18 mg per day. The main benefit of iron has to do with the transport of oxygen by red blood cells. Therefore, iron deficiency can inhibit the supply of oxygen to various organs of the body which is a sign of anemia such as lethargy, looking pale, headaches and dizzy eyes.

The body needs iron to form hemoglobin, a special protein in red blood cells that binds oxygen. If the amount of hemoglobin is low, the red blood cells cannot carry enough oxygen throughout the body. Adequate iron intake will maintain and even increase the production of hemoglobin so that red blood cells can bind oxygen optimally. Lack of hemoglobin can cause anemia. Red blood cells are not able to carry oxygen properly so that the organs lack oxygen. As a result, the body feels lethargic accompanied by dizziness, shortness of breath, and palpitations. This is a symptom of iron deficiency anemia.

In female adolescents, the risk of losing a lot of iron occurs because the process of blood decay during menstruation is not matched by adequate iron intake. condition of reproductive hormones that are not yet stable in female adolescents results in too much menstrual blood so that the body becomes weak and looks pale. This problem can be overcome by consuming red beans which are proven to contain significant iron to help increase hemoglobin levels.

CONCLUSION

Based on the results of the study it can be concluded that consuming red beans which are rich in iron can help overcome the problem of anemia in female adolescents. The iron in red beans functions to form hemoglobin so that it can prevent anemia. The limitation of this research is that the number of samples is still relatively small. It is hoped that further researchers can increase the number of samples so that the research results are more representative.

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