

A COMPARATIVE STUDY OF RED DRAGON FRUIT JUICE WITH RED GUAVA JUICE ON HEMOGLOBIN LEVELS IN ADOLESCENTS

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Abstract

Anemia causes learning achievement to decrease. Hematopoiesis requires macronutrients found in red dragon fruit and red guava. Objective of research to determine differences in the effectiveness of administration of red guava juice and red dragon fruit juice on hemoglobin (Hb) levels in young women. This type of research is quasi-experimental research design with pre-test and post-test without control. The sampling technique uses probability sampling. Data analysis using Paired T-Test and Independent T-Test. The mean Hb level of red guava juice group was pre test 13.18 gr / dL and post test 14.71 gr / dL with P value 0.000. The mean Hb levels of the red dragon fruit juice group were 13.13 gr / dL pre test and 15.41 gr / dL post test with P Value 0,000. Red guava juice and red dragon fruit juice were equally effective in increasing Hb levels.

Keywords: Hemoglobin; Red Guava; Red Dragon Fruit

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1. Introduction

Anemia, the most common nutritional problem in the world. Anemia occurs mostly in society, especially young women. The prevalence of anemia in Indonesia is 21.7% with ages 5-14 years of 26.4% and 18.4% of patients aged 15-24 years. The prevalence of anemia in Yogyakarta aged 12-19 years is 36.00% where the city of Yogyakarta has an anemia incidence rate of 35.2% (Kementerian Kesehatan RI, 2018). Anemic conditions can affect learning and decreased achievement. During puberty, young women will experience menstruation, menstruation that occurs in young women can increase the occurrence of anemia. This is because the volume of blood that comes out is 35-50 ml. The amount of blood that comes out can cause weakness, lethargy. Anemia can be treated pharmacologically and non pharmacologically. One of the non-pharmacological therapies is giving red guava juice and red dragon fruit juice. Several studies on the benefits of guava and dragon fruit are able to help increase Hb levels (Suharjiman & Iden, 2018; Thamrin et al., 2018; Yeri Esty Ningtyastuti, 2007), but there is no research to compare the effectiveness of the two.

2. Methods

This type of research is a Quasi-experimental research design, namely pre-test and post test without control (Dharma, 2011). This research was conducted at a State Senior High School in Sleman Yogyakarta. The population in

this study were all students of class X. The sampling technique used in this study was simple random sampling, which was in accordance with the inclusion and exclusion criteria. In this study, the sample used was 36 respondents who were divided into 2 groups of 18 respondents each. The independent variables in this study were red guava juice and red dragon fruit juice. The dependent variable was the hemoglobin level in adolescent girls (Dharma, 2011)

The analysis technique used is univariate and bivariate. Univariate analysis of numerical data types used mean, median mode and standard deviation. Furthermore, the researcher conducted a hypothesis test using the Paired T-Test. The different test on the post test of the two groups used the Independent T-Test (Notoatmodjo, S., 2018)

3. Results

Based on Table 2, the Paired T-Test obtained a mean value of 13.18 gr / dl before giving and 14.71 gr / dl after being given the intervention with $p = 0.000$ which statistically showed a difference in Hb levels before and after the treatment of giving red guava juice.

Based on Table 3, the Paired T-Test obtained the mean value of 13.13 gr / dl before being given and 15.46 gr / dl after being given the intervention with $p = 0.000$ which statistically showed a difference in Hb levels before and after the treatment of red dragon fruit juice.

Table 1. Frequency Distribution of Characteristics of Red Guava Juice and Red Dragon Fruit Juice on Hemoglobin Level

Characteristics	Red Guava Juice		Red Dragon Fruit Juice	
	F	%	F	%
Age				
15 years	3	16,7	2	11,1
16 years	15	83,3	15	83,3
17 years	-	-	1	5,6
Total	18	100	18	100
Tea consumption				
Never	6	33,3	9	50
1 time a day	9	50	5	27,8
2 time a day	3	16,7	3	16,7
3 time a day	-	-	1	5,6
Total	18	100	18	100
Consume Iron Foods				
Spinach	9	50	10	55,6
Red meat	6	33,3	2	11,1
Nuts	3	16,7	6	33,3
Total	18	100	18	100
Sport habit				
never	6	33,3	13	72,2
1 time a week	12	66,7	5	27,8
Total	18	100	18	100

Table 2. Differences In Hemoglobin Levels Before And After Giving Red Guava Juice

Hemoglobin Levels	Mean(\pm SD)	Difference the mean	IK 95%		p value
			Lower	upper	
Pre Test	13,18 \pm 1,32	1,52	-2,087	-,958	0,000*
Post Test	14,71 \pm 0,91				

*Paired T-Test

Table 3. Differences In Hemoglobin Levels Before And After Giving Red Dragon Frutite juice

Hemoglobin Levels	Mean(\pm SD)	Difference the mean	IK 95%		p value
			Lower	Upper	
Pre Test	13,13 \pm 1,53	2,32	-3,088	-,1,557	0,000*
Post Test	15,46 \pm 1,69				

*Paired T-Test

Based on table 4, the hemoglobin level after offering red guava juice has a mean value of 14.71 gr / dl and the red dragon fruit juice group is 15.46 gr / dl with a p value = 0.106 which shows that there is no statistical difference between red guava juice and Red dragon fruit juice on HB levels in adolescent girls. Difference in hb levels after and before consumption of guava juice and red dragon fruit juice

4. Discussion

Pre-Test Hemoglobin Levels in the Red Guava Juice Group

Based on table 2, it can be seen that the hemoglobin level before being given red guava juice has a mean value of 13.18 gr / dl. Hemoglobin levels in young

women can decrease by several factors, namely the adequacy of iron in the body where iron is needed to produce hemoglobin. Age, the more you get older, the more you will experience a physiological decline. This is according to the function of organs including bone marrow which produces red blood cells. Gender in female sex is more susceptible and prone to decreased hemoglobin levels. The habit of drinking tea every day can inhibit the absorption of iron so that it will greatly affect hemoglobin levels (Thamrin, H, 2018). This is in line with previous research, namely the effect of giving red guava juice on hemoglobin and ferritin serum levels of anemia sufferers in adolescent girls obtained an average value. - The average before intervention is 10.50 gr / dl (Rusdi PH, Oenzil F, & Chundrayetti E., 2018).

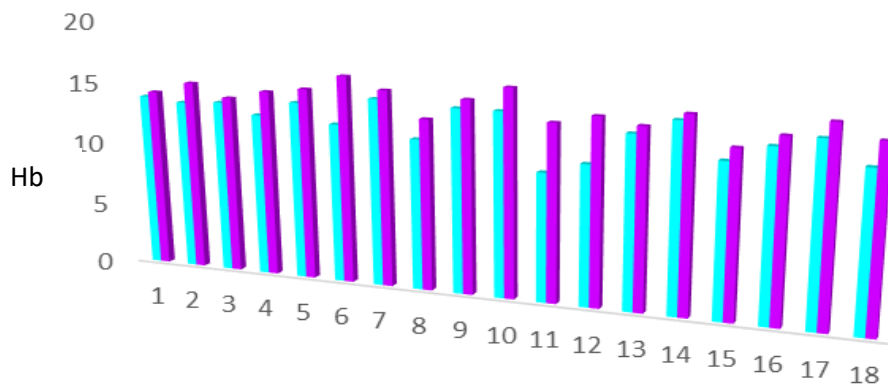


Figure 1. Graph of HB levels before and after consumption Red Guava

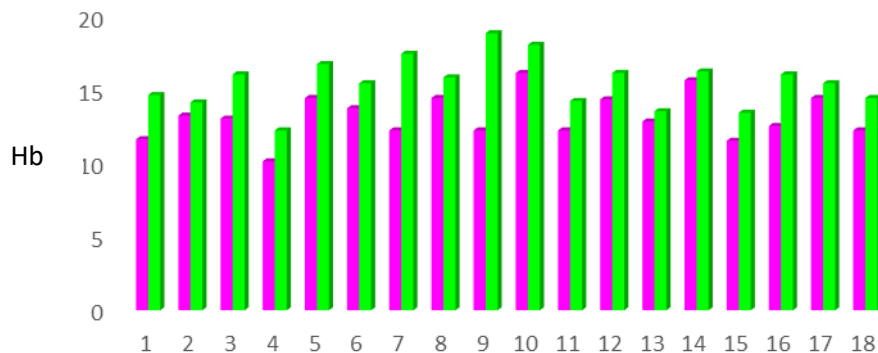


Figure 2. Graph of HB levels before and after consumption Red Dragon Fruit Juice

Table 4. Differences in Post-Test Hemoglobin Levels in the Red Guava Juice and Red Dragon Fruit Juice Group.

Differences in Hemoglobin Levels	Post-Test Mean (SD)	Difference the mean (SD)	IK 95%		p value
			Lower	Upper	
Red Guava Juice (n=18)	14,71	0,750	-1,669	-,1,69	0,106*
Red Dragon Fruit Juice (n=18)	15,46				

* T-Test Independent

Pre-Test Hemoglobin Levels in the Red Dragon Fruit Juice Group

Based on table 3, pre-test hemoglobin levels were given red dragon fruit juice which has a mean value of 13.13 gr / dl. Hemoglobin levels in adolescent girls can decrease due to several factors such as menstruation, unhealthy eating habits, lazy drinking water and unhealthy diets because they want to look slim or ignore sources of protein, carbohydrates, vitamins and minerals. Habit of snacking on low-nutrient foods and ready-to-eat foods. So that adolescents are not able to meet the diversity of nutrients their bodies need for the synthesis process of hemoglobin formation. If this happens for a long time it will cause the hemoglobin level to continue to decrease and lead to anemia). This is in line with previous research, namely the effect of giving red dragon fruit juice on increasing hemoglobin in adolescent girls who experience

anemia at SMAN 4 Pangkep, the average value before intervention is 13.00 gr / dl (Usman, M., Arman. , Kurnaesih, E., 2019).

Based on Table 2, post-test hemoglobin levels, giving red guava juice once a day for 7 days to 18 respondents had a mean post test value of 14.71 gr / dL with a value of $p = 0.000$ ($p < 0.05$), indicating a significant difference. between before and after the red guava juice intervention. This is supported by previous research conducted by Suharjiman (2016). Red guava fruit in every 100 grams contains 49 kcal calories, amino acids (tryptophan, lysine), 14 mg calcium, 28 mg phosphorus, 1.10 mg iron, vitamin A 25 SI, vitamin B1 0.02 mg and vitamin C 87 mg are needed in the formation of blood. The mineral content in red guava can overcome anemia and can accelerate the process of hemoglobin formation. Mineral content such as magnesium, copper and manganese.

Manganese is used by the body as a co-factor for the antioxidant enzyme, superoxide dismutase. Copper is needed in the production of red blood cells. In this red guava fruit contains compounds that increase hemoglobin levels in the blood such as iron, vitamin C, vitamin A. Iron is a mineral that is needed to transport oxygen throughout the body. Iron with vitamin C forms a complex iron ascorbate which is soluble and easily absorbed by the organs in the human body. The conversion of non-heme iron in the form of ferric metabolic compounds to ferrous will be greater if the pH in the stomach gets more acidic. Vitamin C can increase acidity so that it helps increase iron absorption by 30%. Suryani, D., Hafiani R., & Junita R. (2015).

Post-Test Hemoglobin Levels in the Red Dragon Fruit Juice Group

Based on Table 3, post-test hemoglobin levels, giving red dragon juice once a day for 7 days to 18 respondents had a mean post test value of 15.46 gr / dL with a value of $p = 0.000$ ($p < 0.05$), indicating a significant difference between before and after the red dragon juice intervention. This research is in line with research conducted by Thamrin (2018), which examines dragon fruit increasing hemoglobin levels in female adolescents, which is an increase in hemoglobin levels in respondents who were given red dragon juice intervention for 7 days.

Dragon fruit in every 100 grams contains 83.0 g of water calories as a food ingredient that contains complete nutrients needed by the body, where the protein content is 0.229 g, iron 0.65 mg, vitamin A, vitamin B2 0.045 mg, and vitamin C 9 mg contained in dragon fruit plays a role in the body's metabolism so that it can increase hemoglobin levels in the blood. The mechanism of association between vitamin A and anemia occurs through several possibilities, namely erythropoiesis regulation, mobilization of iron from reserves to the body's transferrin circulation from infection, and increasing iron absorption in the intestine. Meanwhile, vitamin B2 deficiency causes anemia due to impaired absorption and mobilization of iron. Vitamin C plays a role in the absorption of iron by reducing ferrous to ferrous in the small intestine so that it is easily absorbed. Vitamin C also increases the absorption of iron from plant (non-heme) foods (Iswahyuni, S., Sayekti, S., Sunaryanti,

Post-Test Hemoglobin Levels in the Red Guava Juice and Red Dragon Fruit Juice Group
Based on Table 4, it is known that post-test hemoglobin levels have a mean value in the red guava juice group of 14.71 gr / dL and in the red dragon juice group 15.46 gr / dL with a value of $p = 0.106$ ($p = 0.05$) which indicates there is no significant difference. This is different from the results of previous studies which state that red guava juice is more influential in increasing hemoglobin levels in post partum mothers with anemia

compared to red dragon fruit juice (Barirah., Runjati., Pramono, N., 2018). This also contradicts the results of research related to the content of red guava and red dragon fruit which have iron and vitamin C which can increase hemoglobin levels. The iron content in red guava is 1.1 mg and 87 mg of vitamin C, while in red dragon fruit the iron content is 0.55 mg and 8 mg of vitamin C.

Increased hemoglobin levels are not only affected by red guava juice and red dragon fruit juice but can be influenced by other factors such as the consumption of foods containing substances needed in hemoglobin synthesis such as spinach and limiting drinks containing tannin compounds such as tea (Thamrin, H., 2018) The habit of drinking tea can affect hemoglobin levels seen from table 4.1 of the frequency distribution of respondents who do not consume tea in respondents who consume red dragon juice more than from red guava juice, which is 9 people. In the red guava juice group, there were 6 people.

This is in line with previous studies which stated the relationship between tea consumption habits and hemoglobin levels in pregnant women. The habit of drinking tea can cause disturbed red blood cells. This is because the excessive content of tannin compounds in tea in the blood can bind minerals so that it will interfere with iron absorption (Nugrahani, I, 2013) In the red dragon fruit juice group, 10 people consumed spinach more than 9 people in the red guava juice group. This is in accordance with previous research which states the effect of giving green spinach juice on increasing hemoglobin levels in anemic pregnant women in the working area of the public health center, where spinach is a source of calcium, the vitamin content in spinach is vitamins A, B2, B6, B12, C, and vitamin K, manganese, magnesium, iron, potassium, and phosphorus, fiber and also beta-carophene. In addition, spinach has a high iron content to prevent anemia.

The mineral content in spinach is quite high, especially iron which can be used to prevent fatigue due to anemia. High iron content plus B vitamins, especially folic acid (Taufiq, M, 2016). The increase in hemoglobin levels is supported by the consumption of foods that contain vitamin B6 and vitamin B12 found in spinach. Furthermore, the interaction between heme and globin will produce hemoglobin. The high content of vitamin C in spinach can help the induction of iron in the body so that it can bind to the heme group on hemoglobin molecules, including vitamin B6 folate and isoleucine. The content of vitamin C in spinach functions to convert ferrous to ferrous so that the iron in the body is able to bind to oxygen. Vitamin B6 and folate play a role in blood formation. Isoleucine is an essential amino acid which has a major role in the formation of red blood cells (Taufiq, M, 2016)

5. Conclusions

The mean value of hemoglobin levels before the intervention of red guava juice is 13.18 gr / dL. The mean value of hemoglobin levels after the intervention of red guava juice is 14.71 gr / dL. The mean value of hemoglobin levels before the intervention of red dragon fruit juice is 13.13 gr / dL. The mean value of hemoglobin levels after the intervention of red dragon fruit juice is 15.46 gr / dL. There was no significant difference in the effectiveness of hemoglobin levels after the intervention in the red guava and red dragon juice groups.

6. Suggestion

Researchers suggest for Respondents that young women can prevent anemia by consuming 250 ml of red guava juice or red dragon fruit juice once a day and increasing iron-containing foods such as spinach, red meat and nuts and not drinking tea and coffee.

Researchers suggest for SMA N 2 Ngaglik that the school or school principal notify the school canteen to sell or provide red guava juice and red dragon fruit juice so that students can consume the juice regularly to prevent anemia.

Researchers suggest that further researchers can continue this research by adding other variables and controlling for factors that can affect hemoglobin levels such as consuming tea and caffeine.

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