

The Effect of Red Guava (*Psidium guajava l.*) Juice on Hemoglobin Levels During Menstruation in Adolescent Girls

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ABSTRACT

Adolescent girls will lose blood which can cause a decrease in hemoglobin levels during menstruation. The function of iron is needed by the body to produce blood. Consumption of foods containing vitamin C plays a role in accelerating the absorption of iron so that it can increase hemoglobin levels during menstruation. Red guava (*Psidium guajava l.*) has a high vitamin C content of 87 mg/100 grams. This study aims to determine the effect of giving red guava juice on hemoglobin levels during menstruation in adolescent girls at Lirboyo Al-Mahrusiyyah Islamic Boarding School's female dormitory, Kediri, East Java. This research is a true experiment with a randomized pretest-posttest control group design with a sampling technique using simple random sampling. The samples were divided into 4 groups, namely 1 control group (no treatment), and 3 treatment groups with 200 mL/person/day of red guava juice, 250 mL/person/day), and 300 mL/person/day of guava juice. given for 5 days of menstruation. Hemoglobin levels were measured using the Quik-Check Hemoglobin testing system. The results of the study stated that there was an effect of red guava juice on hemoglobin levels during menstruation ($p=0.000$). The results of the Tukey HSD test proved that there were differences in hemoglobin levels between groups, namely for the control group with P1 ($p=0.004$), the control group with P2 ($p=0.000$), the control group with P3 ($p=0.000$), P1 and P2 ($p=0.000$), and P1 with P3 ($p=0.000$). So it can be concluded that giving red guava juice can affect hemoglobin levels during menstruation in adolescent girls.

I. Introduction

Adolescence is a change from childhood to adulthood and usually, there will be several signs such as faster physical, emotional, mental, and social development. Usually, adolescents or girls will experience puberty which is marked by the occurrence of conception or menarche (menstruation for the first time) (Pratita, 2013). The need for iron during adolescence will increase, because during adolescence there will be rapid growth, especially for young women who will experience menstruation every month. These young women will experience a loss of iron from the blood released around 1.3 mg per day so the need for iron will be more than that of young men (Noor Hidayat, 2015).

One part of the hemoglobin molecule is iron, hemoglobin synthesis will decrease if iron is also reduced and can cause a decrease in hemoglobin levels in the blood. The ability to deliver oxygen throughout the body's tissues will be affected by decreased levels of hemoglobin in the blood, it can indirectly reduce the ability of young women to concentrate well and can reduce the learning achievement of the young women themselves (Afryan and Ristyaning, 2016). The low level of iron absorption will cause the body to have difficulty meeting iron needs. Increased absorption of iron,



especially non-heme iron or iron derived from plants, is influenced by foods that contain high vitamin C (Adriani, 2012).

One of the roles of vitamin C in the body is as an antioxidant and can maximize the absorption of iron. The action of vitamin C will reduce iron from the ferric or Fe³⁺ form to the ferrous or Fe²⁺ form which occurs in the small intestine so that it is easily absorbed by the body. The process of absorption of iron in the body requires the presence of vitamin C, thus vitamin C also plays a role in the formation of hemoglobin, so that it can increase hemoglobin levels in the blood (Mahardika and Zuraida, 2016). Of the various types of fruits, one of them that contains high vitamin C is red guava (*Psidium guajava l.*) From the results of a study conducted by Sambou et al., (2014) it was found that giving red guava juice at a dose of 3 mL/KgBW had a significant difference with giving red guava juice doses of 2 mL/KgBW and 2.5 mL/KgBW on blood hemoglobin levels of white male rats Wistar strain (*Rattus novergicus*).

Based on a preliminary study with interviews with young women at SMA 7 Kediri, East Java, it is known that they eat 3 times a day on average, and while at school they are free to buy food outside of school. Especially for teenage girls who are menstruating, will need additional iron intake due to iron loss from the blood they secrete (Almatsier, 2009).

Therefore, researchers conducted a study on the effect of red guava juice (*Psidium guajava l.*) on hemoglobin levels during menstruation in young women. Thus it is expected that there will be an increase in hemoglobin levels during menstruation in young women after being given red guava juice.

II. Methods

Design and Samples

This research is a True Experiment Design using the Randomized Pretest-Postest Control Group Design, in which two groups are randomly selected, then a pretest will be carried out to find differences or discrepancies with the control group in the treatment that will be given. In this study, the samples were young women at Lirboyo Al-Mahrusiyyah Islamic Boarding School's female dormitory, Kediri, East Java in January 2023, who were aged between 15-17 years and were menstruating. Sampling used the Simple Random Sampling technique with a total sample of 24 people.

Data Collections

The research subjects were divided into 4 groups, namely the control group (KK), the treatment group (KP) 1, the treatment group (KP) 2, and the treatment group (KP) 3. The procedure for making guava juice is by mixing 100 ml of water with 100 grams, 150 grams and 200 grams fresh guava, so that the volume of guava juice for P1 is 200 mL, P2 is 250 mL, and P3 is 300 mL which is served in a bottle. In the process of making red guava juice, sweeteners or sugar are not added.

Blood sampling before being given red guava juice is done on the first day of menstruation, namely in the morning before eating at 05.30. Red guava juice is given from the first day of menstruation until the 5th day and is given once a day in the morning before breakfast. Red guava juice was drunk by respondents with 1 consumption for all treatment groups. Checking hemoglobin levels after treatment was carried out on the 6th day of menstruation in the morning at 05.30. Capillary blood sampling was taken from the fingertips of the left hand.

Data Analysis

Statistical tests for variables used the One Way ANOVA. All tests are done by using SPSS for Windows 24. To determine whether there are differences in the effect of giving red guava juice (*Psidium guajava l.*) on blood hemoglobin levels during menstruation in young women, then proceed with the Post-Hoc Tukey-HSD test with a degree of confidence of 95% ($p < 0.05$).

III. Results and Discussion

Based on the results of the study, it is known that the dominant age of the respondents is a 17-year-old adolescent girls with a total of 54.2% of the total 24 respondents. Most of the respondents experienced their first menstruation (menarche) at 12 years old (41.7%). The results of the 2018 Riskesdas stated that most adolescents in Indonesia experienced menarche at the age of 13-14 years. Adolescent girls will need foods with high iron content, especially those who will experience menstruation every month. During menstruation, young women can lose as much as 0.5-1 mg/day of

iron, or the equivalent of iron needs that must be met during menstruation, which is as much as 12 mg/day. Iron requirements can increase to 1.4 mg when women are menstruating (Gibney et al., 2009).

The treatment given in this study was red guava juice (*Psidium guajava l.*). This fruit was chosen because it contains high enough vitamin C, which is 87 mg/100 grams of red guava fruit (Hakimah, 2010). Vitamin C contained in red guava fruit acts as an enhancer or can accelerate the absorption of iron. Vitamin C also functions to increase the absorption of non-heme iron by four times, vitamin C and iron will form complex absorption compounds that are easily soluble and easily absorbed (Masthalina et al., 2015).

Based on the results of the One Way ANOVA test, a significant number of 0.000 was obtained, which means that giving red guava juice (*Psidium guajava l.*) at different doses can make a significant difference in influencing the increase in blood hemoglobin levels during menstruation in young women ($p < 0.05$). The results of statistical with One Way ANOVA test are presented in the table below.

Table 1. The Mean Value of One Way ANOVA Test

Group	N	Mean
Control group (KK)	6	-0.13
Teratment group 1 (KP 1)	6	-0.43
Teratment group 2 (KP 2)	6	0.65
Teratment group 3 (KP 3)	6	0.45
Total	24	-0.09

The average value of the delta hemoglobin level was -1.03 in the control group (KK), namely respondents who were not given any treatment, -0.43 in the treatment group 1 (KP1) red guava juice at a dose of 200 mL, 0.65 in the treatment of 2 (KP2) red guava juice with a dose of 250 mL, and 0.45 in the treatment group 3 (KP3) red guava juice with a dose of 300 mL. The higher the average value, the greater the effect of the dose on increasing blood hemoglobin levels during menstruation. So, it can be concluded that the group that was able to increase hemoglobin levels during most menstruation was in the treatment group 2 (KP2) which was given red guava juice at a dose of 250 mL.

To determine whether there are differences in the effect of giving red guava juice (*Psidium guajava l.*) on blood hemoglobin levels during menstruation in young women, then proceed with the Post-Hoc Tukey-HSD test. The results of Post-Hoc Tukey-HSD test are presented in the table below.

Table 2. Post-Hoc Tukey-HSD Test Result

Group	P-value	Significance	CI 95%	
			Lower	Upper
Control – 200 mL	0.004	Significance	-1.0240	-.1760
Control – 250 mL	0.000	Significance	-2.1073	-1.2594
Control – 300 mL	0.000	Significance	-1.9073	-1.0594
200 mL – 250 mL	0.000	Significance	-1.5073	-.6594
200 mL – 300 mL	0.000	Significance	-1.3073	-.4594
250 mL – 300 mL	0.561	Not Significance	-.2240	.6240

From the results of the analysis using the Post Hoc test, it was found that there were significant differences between the control group and KP 1, KP 2, and KP 3. The results of the analysis also show that there is a significant difference between KP 1 with KP 2 and KP 1 with KP 2, but there is no significant difference between KP 2 with KP 3.

The average hemoglobin level during pre-test and post-test for each group is presented in the figure 1.

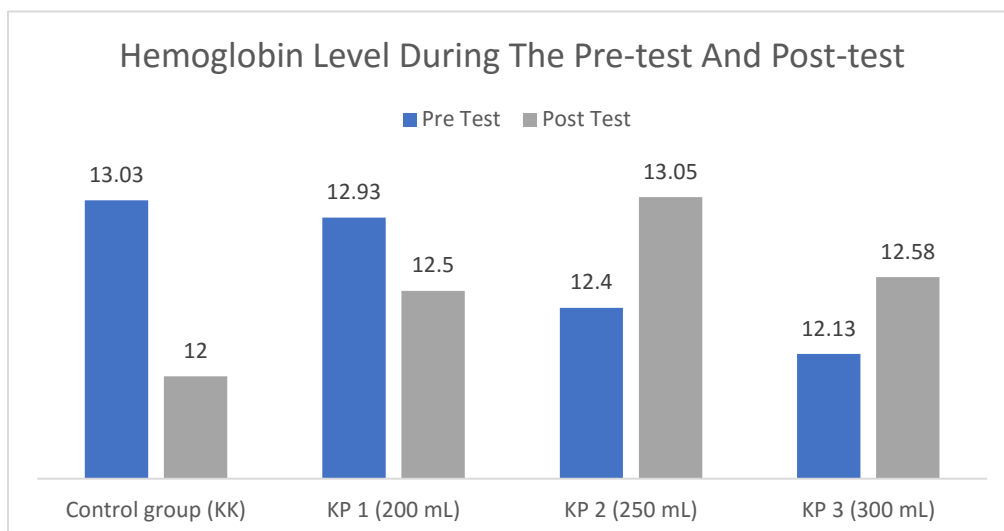


Figure 1. Hemoglobin Level During Pre-Test and Post-Test

The results of this study indicate an increase in blood hemoglobin levels during menstruation in young women after administration of red guava juice (*Psidium guajava l.*) with various doses, including 200 mL/day (KP 1), 250 mL/day (KP 2), and 300 mL/day (KP 3), although the increase in blood hemoglobin levels could not compensate for the amount of decreased hemoglobin levels during menstruation in the control group. The results of this study are in line with research conducted by Sambou et al. (2014) which stated that the administration of red guava juice which is high in vitamin C was proven to significantly increase blood hemoglobin levels in male Wistar rats.

The increase in hemoglobin levels is thought to occur due to the activity of substances contained in the red guava fruit. This can be caused by increased absorption of non-heme iron up to 4 times due to the presence of vitamin C in red guava fruit, namely vitamin C will reduce iron from the ferric form (Fe^{3+}) to ferrous (Fe^{2+}) in the small intestine (Anwar, 2009, Sambou et al., 2014).

According to another study, it was proven that there was a significant difference, namely an increase in Hb levels in the Fe and vitamin C supplementation group compared to the placebo group which did not experience an increase in hemoglobin levels (Wibowo, 2010). This research is in line with the theory put forward by Proverawati (2011) which states that consuming iron (Fe) together with vitamin C can increase absorption and play a very important role in the production of hemoglobin in the blood.

IV. Conclusion

In general, from this study, it can be concluded that there is an effect of red guava juice (*Psidium guajava l.*) on blood hemoglobin levels in female adolescents. Giving red guava juice at a dose of 250 mL is an effective dose that can increase blood hemoglobin levels during menstruation.

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