

Differences Effect of Supplement Red Guava Juice with Red Dragon Fruit Juice to Increase Hemoglobin Levels in Postpartum Mother with Anemia

Barirah¹, Runjati², Melyana Nurul Widyati³, Rr Sri Endang Pujiastuti⁴

¹Postgraduate Midwifery Program, Poltekkes Kemenkes Semarang, Indonesia

^{2,3}Program Studi Midwifery Program, Program Pascasarjana Magister Terapan, Kesehatan, Poltekkes Kemenkes Semarang, Indonesia

⁴Lecturer of Semarang Health Politecnic, Master of Applied Health, Indonesia

Abstract: *Background:* The alternative to prevent anemia in postpartum mothers is to consume fruits with high iron and vitamin C such as red guava fruit and red dragon fruit needed to synthesize hemoglobin. This study aims to prove that the supplement of red guava fruit juice is more influential compared to red dragon fruit juice on increasing hemoglobin levels in postpartum women with anemia. *Methods:* This study used quasy experiment method with nonrandomized pretest and posttest design with control group design. The sample technique uses consecutive sampling, divided into 3 groups consisting of 22 respondents per group. *Results:* Results of the study During the 7-day treatment showed in the intervention hemoglobin levels group red guava fruit juice increased by 2.45 gr/dl. In the intervention group red dragon fruit juice was 1.44gr / dl Whereas the control group was 0.79 gr/dl. With a p-value of 0.000 <math><math>\alpha (0.05) which means there are significant differences. *Conclusion:* Red guava fruit supplementation is more influential in increasing hemoglobin levels in anemia postpartum women who are given Fe tablets compared to red dragon fruit juice

Keywords: Red guava fruit, Red dragon fruit, Anemia, Hemoglobin level

1. Introduction

The postpartum period is a challenge for many new mothers. Recovery from the birth process requires care and treatment, ranging from self-care and care that requires the role of health workers. Loss of blood during labor causes the mother to post partum prone to anemia. Postpartum anemia affects the mother in daily activities, fatigue, postpartum blues and decreased cognitive abilities.^[1]

Postpartum anemia is defined as a condition marked by a decrease in hemoglobin levels below the normal value as a result of preventing blood capacity to carry oxygen around the body.^[1] According to WHO (*World Health Organization*) the incidence of anemia in postpartum mothers is 56%. In India deaths due to anemia reached 19%, from cases of anemia in postpartum mothers 65% -75%.^[2]

Indonesian demographic and health survey data (IDHS) in 2015 stated that the maternal mortality rate (MMR) in Indonesia was 305 per 100,000 live births. In Indonesia, death in postpartum mothers due to anemia reaches 30%.^[3]

Postpartum maternal anemia causes uterine subinvolution which causes postpartum hemorrhage, facilitates puerperium infection, decreases breast milk and easily develops mammary infection.^[1] Government programs that have been implemented in the distribution of Fe tablets for postpartum mothers have not approached the national target and adherence to postpartum mothers in consuming Fe tablets is still lacking, so the two things still do not give a picture of the decrease in the incidence of anemia in Indonesia and in

the province of NTB 50,56%, so that the prevalence of anemia in the province of NTB is still below the national target of 20%.^[25] But apart from giving Fe tablets there are additional nutritional alternatives to prevent anemia in postpartum mothers by consuming fruits with high iron and vitamin C such as red guava fruit and red dragon fruit needed to synthesize hemoglobin, hematocrit and erythrocytes.

2. Literature Survey

Postpartum maternal anemia causes uterine subinvolution which causes postpartum hemorrhage, facilitates puerperium infection, decreases breast milk and easily develops mammary infection.^[1] To prevent the occurrence of anemia in postpartum mothers, by providing additional supplements that use fruits.^[4] Many fruits are used as an alternative supplement to overcome anemia such as red guava fruit and red dragon fruit which are known to contain high levels of vitamin C and iron. Previously known as vitamin C supplements which made it easy to get high doses of vitamin C. But getting vitamin C directly from fresh fruit is more advisable, because it is more easily absorbed and can last longer in the body. Besides consuming fruit also provides more benefits than taking chemical supplements because the fruit does not only contain vitamin C but also contains fiber and other phytochemical compounds that are important for the body. An experiment in mice conducted by scientists at Otago University showed that vitamin C from fruit can be absorbed 5 times faster than vitamin C supplements and bioavailability or levels of vitamin C in the body also last longer when given in fruit form.^[5]

Red guava fruit contains chemicals such as amino acids, calcium, phosphorus, iron, sulfur, vitamin A, vitamin B1, and vitamin C. The mineral content in red guava can overcome anemia sufferers because the red guava fruit contains substances minerals that can smooth the formation of hemoglobin in red blood cells.^[6] As for other foodstuffs besides Guava and dragon fruit, there are fruits such as kiwifruit, longan, papaya, red peppers, broccoli, cabbage, strawberry, kangkangkol, tomato, apple chili, and orange. However, the vitamin C content is much higher in guava, other food ingredients are difficult to obtain and have high prices and must go through processing such as broccoli and cauliflower that must be cooked before consumption.^[7]

The need for vitamin C for a postpartum mother increases by 85 mg of vitamin C per day.^[8] High levels of vitamin C can be obtained in guava fruit, in Latin the guava is called *Psidium Guajava*, in English it is called Guava. The content of vitamin C in guava is higher than oranges, in 100gram Guava contains 87 mg of vitamin C, this fruit also contains several types of minerals that can prevent various types of diseases and maintain body fitness. The leaves and bark contain anti-bacterial substances that can cure several types of diseases. Besides vitamin C, guava also contains potassium and iron.^[9] Based on the research that there are significant differences in the average Hb levels between the control and treatment groups. The results showed an average Hb level in the control group before intervention 9.2 and after 10.5 while the average Hb level in the treatment group before intervention was 9.0 and after 10.9 with an average difference of 1.3 and 1.9.^[10]

While dragon fruit is a cactus from the genera *Hyllococcus* and *selenicereus*. Although including new fruit in Indonesia, this fruit has been widely consumed by the community as a drug to increase endurance and as a blood booster drug.^[11] From the results of previous studies, mature dragon fruit contains organic acids, proteins, minerals such as potassium, magnesium, calcium and iron and vitamin C.^[12]

Based on the results of the study with a sample of female white mice it was concluded that, dragon fruit (*hylocereus undatus*) can increase hemoglobin with an increase in hemoglobin concentration of 100% juice concentration obtained in the intervention group with an average of 13.12 g / dL while in the control group obtain observations with an average of 11.67 g / dL.^[12]

Whereas the research carried out on humans that obtained hemoglobin levels in pregnant women in the intervention group had a greater difference compared to the control group, namely $p\text{-value } 0.037 < \alpha (0.05)$ which means there is a significant effect of red dragon fruit juice on hemoglobin levels of pregnant women on the 7th day of intervention.^[13] The provision of iron tablets along with other micro substances is more effective in improving iron status, rather than being given iron supplementation without vitamin C.^[14] Therefore, to increase iron absorption in the body, supplementation needs to be combined with other micronutrients, such as vitamin A and vitamin C contained in red guava fruit and red dragon fruit, because it plays a role in

the absorption of iron by increasing absorption. non-heme iron up to four times C.^[15] This absorption mechanism includes reducing ferric to ferro in the stomach which is easily absorbed so that both vitamins when synergizing with Fe will be good for the formation of hemoglobin, hematocrit and increased erythrocyte production C.^[16] So it is expected can reduce the prevalence of anemia in postpartum mothers.

3. Methods

This study is the kind of research methods using *Quasi Experiment with non-randomized* study design control group *pre-post test design*.

Population and Sample

Population there are 159 postpartum mothers in the work area of Woha health center and monta health center. Sampling in this study using non-probability sampling technique type Consecutive sampling, based on the inclusion criteria include: 1. Postpartum mother the first day until the 21st day. 2. Postpartum mother with anemia (Hb level <11 g / dl). 3. Mothers who are not taking other supplements except Fe tablets. 4. Mothers who are willing to become respondents. Exclusion criteria include 1. Mothers with a level of compliance with consumption of Fe tablets, red guava fruit juice, red dragon fruit juice less than 100% are considered drop out. 2. Postpartum mother with infectious complications. It was obtained a sample of 20 postpartum mothers, to anticipate the drop out, 10% were added to 22 postpartum mothers for each group so that the total sample for three groups was 66 postpartum mothers who experienced anemia in the work area of Woha Health Center and Monta Health Center Bima District.

Intervention

Intervention was divided into three groups: Intervention Group 1 was given Fe 60 mg tablets taken 1 tablet at night and red guava fruit juice 250 ml bottled at night for 7 days at Monta Health Center.

Intervention Group 2 was given Fe 60 mg tablets taken 1 tablet at night and Red dragon fruit juice 250 ml bottled at night for 7 days at Monta Health Center. The control group was given Fe 60 mg tablets taken 1 tablet at night for 7 days at Woha Health Center.

Instrument

Instrument for examination of hemoglobin levels using a hematology analyzer then the results are recorded in the observation sheet. Maternal demographic data is also recorded including name (initials), age, education, occupation, income, parity and nutritional status.

Ethical consideration Ethical

Approval of this study was obtained from the Ethics Committee of the Health Ministry of Health Poltekkes Semarang with the number: 384 / KEPK / Poltekkes- SMG / EC / 2018. Before data collection, informed consent was signed by each respondent.

Data analysis, Shapiro Wilk test is used to test data normality. Paired T-test to test the average pre and post value of each intervention provided that the data must be normally

distributed. Therefore in this study using 3 intervention groups so as to examine differences in the effect of interventions between groups using the One way ANOVA method.

4. Results & Discussion

Red guava fruit supplement is more influential in increasing hemoglobin levels in postpartum anemia mothers who are given Fe tablets compared to red dragon fruit juice

Table 1: Hemoglobin levels before and after intervention

Variables	Before	After	P value
Hemoglobin	Mean±SD	Mean±SD	
Intervention 1	9.79±1.67	12.25±1.55	0.000*
Intervention 2	9.58±1.44	11.03±1.31	0.000*
control	9.95±1.57	10.74±0.97	0.000*

*Paired T-test

Table 1. Based on above the hemoglobin level in the intervention group 1 before intervention averaged 9.79 gr / dl while after intervention 12.25 gr / dl and the difference of 2.45 gr / dl with p -value $0.000 < \alpha (0.05)$ which means that there is a significant difference before and after the intervention in the intervention group 1, in the intervention group 2 before intervention the average is 9.58 gr / dl while after intervention 11.03 gr / dl and the difference of 1.44 gr / dl with p -value $0.000 < \alpha (0.05)$ which means that there is a significant difference before and after the intervention in this group intervention 2, in the control group before intervention the average was 9.95 gr / dl while after intervention 10.74 gr / dl and the difference of 0.79 with p -value $0.000 < \alpha (0.05)$ which means that there were significant differences before and after the intervention in the control group.

Table 2: Differences in the effect of Hemoglobin Level between interventions

	Intervention 1	Intervention 2	Control	p
Pre	9.79±1.67	9.58±1.44	9.95±1.57	0.737
Post	12.25±1.55	11.03±1.31	10.74±0.97	0.001
Δ	2.45±1.13	1.44±0.67	0.79±0.87	0.000

*One way anova

Table 2. Test results *One Way Anova* showed differences in hemoglobin levels before treatment between intervention 1, intervention 2 and control with p -value $0.737 > \alpha (0.05)$, which means there is no significant difference, whereas after treatment between intervention 1, intervention 2 and control with p -value $0.000 < \alpha (0.05)$ which means that there is a significant difference.

Supplements of guava fruit juice are more influential in increasing hemoglobin levels in anemia postpartum mothers given Fe tablets compared to red dragon fruit juice. From the analysis, it turns out that the hypothesis about supplementation of red guava fruit juice is more influential in increasing hemoglobin levels in anemia postpartum mothers given Fe tablets compared to red dragon fruit juice received.

After being treated with Fe tablets plus red guava fruit juice, there was a sharp increase in hemoglobin (2.45 gr/dl)

compared to intervention 2 and the control group. The statement is supported by research that consuming iron tablets and red guava fruit juice for 7 days can increase hemoglobin formation in pregnant women in third trimester.¹⁵ Research conducted in Surakarta which stated that giving vitamin C showed a significant increase in hemoglobin which was carried out in Surakarta nursing undergraduate students.¹⁴

The results of other studies that showed that giving Fe tablets and guava fruit juice had a significant effect on increasing hemoglobin levels in adolescent girls who experienced iron deficiency anemia after being given 1 cup guava juice (250cc) per day for 7 days on average Hemoglobin levels increased in the treatment group before intervention 9.0 g / dl and after intervention 10.9 gr / dl with an average difference of 1.9.¹⁰

This is because these two treatments contain compounds that can increase iron levels in the blood. In red guava fruit contains compounds that can increase hemoglobin levels in the blood, including: iron, vitamin C, vitamin A, copper and phosphorus. In increasing hemoglobin levels maternal postpartum is not only affected by Fe supplement alone but is supported by the consumption of foods containing substances needed in hemoglobin synthesis. Guava fruit contains vitamin C needed in globin synthesis.¹²²

The content of red guava fruit which has a high content of iron and vitamin C is 87 mg / 100 grams compared to red dragon fruit which only contains 25 mg / 100 grams of vitamin C. The role of vitamin C in the process of iron absorption is by reducing ferric iron (Fe^{3+}) to Ferrous (Fe^{2+}) in the intestine so that it is easy to absorb, the reduction process will become even greater if the PH in the stomach increases so that it can increase absorption of substances iron up to 30%.¹⁶

Because red guava fruit has a high vitamin C content, giving iron tablets along with other micro substances such as vitamin C obtained from fresh fruit is more advisable because it is more easily absorbed and can last longer in the body and is more effective in improving the absorption process Non-heme iron in the body is up to four times higher than the administration of Fe tablets without the support of vitamin C so that fruits that contain high levels of vitamin C such as red guava fruit are good for consumption to prevent anemia.²³

The results of this study are not in line with research that proves the Effectiveness Test of Red Guava Fruit Juice (*Psidium Guajava*, Linn.) On Hemoglobin (Hb) Blood Level of Male White Rat Wistar Strain (*Rattus Norvegicus* L.). Pharmacology with the results of a study that showed red guava fruit juice did not give an effect on increasing blood hemoglobin levels which based on statistical tests there was no significant difference with KP2 on blood hemoglobin levels of male white wistar rats.¹⁷

Red dragon fruit juice in this study experienced an average increase in hemoglobin level (1.44 g/dl). The statement is consistent with studies that prove that giving juice red dragon with a dose of 250cc / day given in pregnant women

with anemia during the 14 days showed hemoglobin levels before and after drinking juice red dragon fruit is obtained *pretest* day 1 with *posttest* on day 7 there was a significant difference with *p* value 0.000, and on *pretest* the 7th day with *posttest* 14th day there was no significant difference with *p* value 0.763.^[13] Whereas in the control group which only got Fe tablet treatment, the mean hemoglobin level (0.79 g/dl) increased. The results of this study are supported by studies that prove the effect of iron supplementation one and two times per week on hemoglobin levels in students who suffer from anemia with the results of the study which showed no significant difference in Hb levels between the two intervention groups (*p* = 0, 31).

The average increase in Hb levels of students who were given supplementation 1 time per week was 2.20 g/dl while those who were given supplementation 2 times per week amounted to 2.28 g/dl so that the intervention of giving iron supplementation, accompanied by monitoring the consumption of tablets added blood, can be given just once per week because the results on increasing Hb levels are not different from supplementing tablets with blood twice a week.^[18]

The administration of Fe tablets without the support of other nutrients will affect the level of iron absorption so that the bioavailability is lower compared to the administration of Fe tablets along with red guava fruit juice. Thus the highest change in hemoglobin level in the guava fruit juice group.

5. Conclusion

Supplements of red guava fruit juice are more influential in increasing hemoglobin levels in anemia postpartum mothers given Fe tablets compared to red dragon fruit juice.

6. Other Recommendations

a) For the development of midwifery

It is expected that this research can help improve understanding and enrich knowledge, especially in the field of midwifery, especially in postpartum mothers with anemia so that they can apply alternative nutritional supplements to supplement red guava fruit juice to prevent anemia so that the incidence of anemia can be prevented since the beginning.

b) For Midwifery Care

The results of this study are expected to be used as information on providing midwifery care for the provision of local ingredients, namely red guava fruit as a contribution to preventing anemia.

c) For Research Sites

The results of this study can be used as a reference in implementing guidelines in managing interventions to prevent anemia independently in midwifery actions by utilizing local ingredients of red guava fruit juice that can be applied as midwifery care for prevention of postpartum anemia

d) For Further Research

It is hoped that this study can help develop future research related to the role of red guava towards increasing hemoglobin levels

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