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Effectiveness of dragon fruit juice and red guava juice in increasing hemoglobin levels among pregnant women with anemia

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Abstract

Background: Anemia in pregnant women causes premature birth, prolonged labor due to uterine muscle fatigue in contracting (uterine inertia), postpartum hemorrhage due to the absence of uterine muscle contractions (uterine atony), shock, infection both during labor and postpartum, and severe anemia (<4 gr%) can cause cordis decompensation.

Purpose: To analyze the effectiveness of giving dragon fruit juice and red guava juice to increase hemoglobin levels.

Method: The method used is Quasi Experiment with the approach used, namely pre and posttest two groups. The sample in this study were 30 pregnant women in the first, second, and third trimesters with anemia. Sampling used a purposive sampling method, the measuring instrument used was an observation sheet.

Results: This study found that the average hemoglobin level before administration of red guava juice was 10.367 g/dL, after administration of 12.300 g/dL, and the average hemoglobin level before administration of red guava juice was 10.187 g/dL, after administration of 11.640 g/dL. Red guava juice was more effective than dragon fruit juice in increasing hemoglobin levels in pregnant women with anemia with a p-value of $0.001 < 0.05$ and a mean difference of 0.066.

Conclusion: There is an effect of administering dragon fruit juice and red guava juice on increasing hemoglobin levels in pregnant women with anemia.

Suggestion: It is recommended that community health centers and clinics develop non-pharmacological treatments for pregnant women, especially those with anemia.

Keywords: Anemia; Dragon Fruit Juice; Pregnant Women; Red Guava Juice.

INTRODUCTION

Developing countries continue to face a high prevalence of anemia among pregnant women. This condition is characterized by low hemoglobin (Hb) levels in the blood due to a decreased number of red blood cells or the reduced ability of blood to carry oxygen to body tissues. Hemoglobin is a complex protein in erythrocytes that functions to transport oxygen throughout the body. Low hemoglobin levels can cause symptoms such as fatigue, weakness, dizziness, and shortness of breath in pregnant women (Chendriany, Kundryanti, & Lail, 2021).

Anemia in pregnant women is generally caused by deficiencies of iron, folic acid, vitamin B12, and protein. This condition can increase the risk of complications during pregnancy and childbirth, such as premature labor, uterine inertia, postpartum hemorrhage, infection, shock, and even maternal and infant mortality. In severe anemia, hypoxia may lead to cardiac decompensation that endangers maternal safety during delivery (Ministry of Health of the Republic of Indonesia, 2021).

Global data show that the prevalence of anemia

among women of reproductive age remains high. The World Health Organization (WHO) reported that in 2019 the prevalence of anemia among women of reproductive age reached 29.9%, while among pregnant women it reached 36.5%. In Indonesia, the prevalence of anemia among pregnant women increased from 37.1% to 48.9% in 2018. Cases of anemia are more commonly found in rural areas compared to urban areas (Ministry of Health of the Republic of Indonesia, 2020).

In Banten Province, the number of anemia cases among pregnant women in 2019 exceeded 80,000 cases per year and decreased to around 60,000 cases in 2020 (Amlia & Nency, 2024). Meanwhile, data from the Tangerang District Health Office in 2021 showed that the incidence of anemia among pregnant women reached 68.49% for mild anemia and 31.15% for severe anemia (Tangerang City Central Statistics Agency, 2021). Preliminary study results at Kronjo Community Health Center showed an increase in anemia cases among pregnant women from 129 cases in 2022 to 137 cases in 2024. These data indicate that anemia in pregnant women remains a serious health problem requiring attention.

The management of anemia in pregnant women can be carried out through pharmacological and non-pharmacological approaches. Pharmacological treatment is conducted through the administration of Fe tablets containing ferrous sulfate and folic acid to help hemoglobin formation (Diniyuningrum, Meiranny, & Risana, 2026). However, the consumption of Fe tablets often causes side effects such as nausea and constipation, resulting in low compliance among pregnant women in consuming Fe tablets. Therefore, non-pharmacological alternatives are needed through the consumption of foods rich in iron and vitamin C (Hamzah, Rusli, Rurwanti, & Ilham, 2025; (Hamzah et al., 2025; Manurung & Silalahi, 2025).

One fruit that has the potential to increase hemoglobin levels is red dragon fruit. Dragon fruit contains 3.11 mg of iron, which plays a role in the formation of red blood cells, as well as vitamin B12 that helps improve appetite (Arya, 2018). Consuming dragon fruit in juice form is considered more effective because the absorption process of nutrients occurs faster compared to consuming the fruit directly (Chendriany et al., 2021).

Several studies have shown that the consumption

of dragon fruit is effective in increasing hemoglobin (Hb) levels among pregnant women with anemia. Previous studies demonstrated that the administration of dragon fruit juice significantly increased hemoglobin levels in pregnant women during the second and third trimesters. The iron and vitamin C content in dragon fruit support hemoglobin formation and enhance iron absorption in the body (Olii, 2020). Furthermore, another study reported similar findings where the average Hb level of anemic pregnant women increased from 10.55 g/dL to 11.98 g/dL after receiving dragon fruit intervention combined with Fe tablets, with a p-value = 0.000 (Wijayanti, Sari, & Kurniyati, 2025).

In addition to dragon fruit, red guava is also known to contain high levels of vitamin C and iron. Every 100 grams of red guava contains approximately 87 mg of vitamin C and 1.1 mg of iron, which can help improve iron absorption in the body and support hemoglobin formation (Nislawati & Aprilla, 2025). Previous studies stated that red guava juice effectively increased hemoglobin levels in anemic pregnant women from 9.631 g/dL to 12.126 g/dL because the vitamin C content in guava accelerates iron absorption in the body (Supriyatin & Idealistiana, 2024).

RESEARCH METHOD

This study used a quantitative method with a quasi-experimental design. The research design applied was a pretest and posttest two-group design. The study aimed to determine the effectiveness of giving dragon fruit juice and red guava juice on increasing hemoglobin levels in pregnant women with anemia at the Kronjo Community Health Center, Tangerang Regency in 2025. In this study, two intervention groups underwent hemoglobin level measurements before treatment (pretest) and after treatment (posttest). The first group received dragon fruit juice intervention, while the second group received red guava juice for 14 consecutive days, once daily in the morning after meals.

The population in this study consisted of all first, second, and third trimester pregnant women with anemia in the working area of the Kronjo Community Health Center, Tangerang Regency, from March to July 2025, totaling 33 individuals. The sampling technique used was purposive sampling, with a total sample of 30 respondents who met the inclusion and

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exclusion criteria. The inclusion criteria included first, second, and third trimester pregnant women with iron deficiency anemia and Hb levels <11 g/dL who were willing to participate as respondents.

Data collection was conducted using observation sheets and the *Easy Touch* digital hemoglobin measuring device. Hemoglobin levels were measured before the intervention and after 14 days of juice administration in each group. Data analysis was

carried out using univariate analysis to describe the characteristics of the research variables and bivariate analysis to determine the effectiveness of the interventions on increasing hemoglobin levels. Before statistical testing, the data were first tested for normality. Bivariate analysis used the paired t-test with a significance level of $\alpha = 0.05$ to determine differences in hemoglobin levels before and after the intervention in each group.

RESEARCH RESULTS

Table 1. Differences in Hemoglobin (Hb) Levels Before and After Administration of Dragon Fruit Juice

Variable	Value			p-value
	Mean	Standar Deviation	Min - Max	
Hemoglobin (Hb) Level (Pre-test)	10.187	0.440	9.6 – 10.9	0.000
Hemoglobin (Hb) Level (Post-test)	11.640	0.655	10.7 – 12.7	

Based on Table 1. the results of the study in the dragon fruit juice intervention group showed that the mean hemoglobin (Hb) level of pregnant women before the intervention (pre-test) was 10.187 g/dL. After being given dragon fruit juice for 14 days, the mean hemoglobin (Hb) level increased to 11.640 g/dL. These results indicate an average increase in hemoglobin levels of 1.453 g/dL after the administration of dragon fruit juice. In addition, the increase in the minimum and maximum Hb values in the post-test illustrates that dragon fruit juice had a positive effect on increasing hemoglobin levels among pregnant women with anemia. The statistical analysis using the paired t-test showed a p-value of 0.000 (<0.05), indicating that there was a significant effect of dragon fruit juice administration on increasing hemoglobin levels in pregnant women with anemia. These findings demonstrate that dragon fruit juice is effective in increasing Hb levels among anemic pregnant women.

Table 2. Differences in Hemoglobin (Hb) Levels Before and After Administration of Red Guava Juice

Variable	Value			p-value
	Mean	Standar Deviation	Min - Max	
Hemoglobin (Hb) Level (Pre-test)	10.367	0.345	10.0 – 10.9	0.000
Hemoglobin (Hb) Level (Post-test)	12.300	0.781	11.1 – 13.6	

Based on Table 2. the results of the study in the red guava juice intervention group showed that the mean hemoglobin (Hb) level of pregnant women before the intervention (pre-test) was 10.367 g/dL. After the administration of red guava juice, the mean hemoglobin (Hb) level increased to 12.300 g/dL. These results indicate an average increase in Hb levels of 1.933 g/dL after the administration of red guava juice. Based on the statistical

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analysis using the paired t-test, the p-value obtained was 0.000 (<0.05), indicating that there was a significant effect of red guava juice administration on increasing hemoglobin levels among pregnant women with anemia. These findings demonstrate that red guava juice is effective in increasing hemoglobin levels among anemic pregnant women in the study area.

Table 3. Differences in Hemoglobin (Hb) Levels Before and After Administration of Dragon Fruit Juice and Red Guava Juice (N=30)

Variable	Value			p-value
	Mean	Standar Deviation	Min - Max	
Dragon Fruit Juice	11.640	0.655	10.7 – 12.7	0.000
Red Guava Juice	12.300	0.781	11.1 – 13.6	

Based on Table 3. the results of the study regarding the differences in the effectiveness of dragon fruit juice and red guava juice administration on increasing hemoglobin (Hb) levels among pregnant women with anemia showed that the mean Hb level in the dragon fruit juice group was 11.640 g/dL. Meanwhile, the mean Hb level in the red guava juice group was 12.300 g/dL. These results indicate that both interventions were able to increase hemoglobin levels among pregnant women with anemia. However, the average increase in Hb levels in the red guava juice group was higher than that in the dragon fruit juice group. Statistical analysis showed a p-value of 0.000 (<0.05), indicating that there was a significant difference in effectiveness between dragon fruit juice and red guava juice administration on increasing hemoglobin levels among anemic pregnant women. Therefore, red guava juice was considered more effective in increasing hemoglobin levels compared to dragon fruit juice among pregnant women with anemia.

DISCUSSION

Based on the results of the study in the dragon fruit juice intervention group, the mean hemoglobin (Hb) level of pregnant women before receiving dragon fruit juice intervention was 10.187 g/dL and increased to 11.640 g/dL after 14 days of intervention. Statistical test results showed a p-value of 0.000 (<0.05), indicating that the administration of dragon fruit juice had a significant effect on increasing hemoglobin levels in pregnant women with anemia. The average increase in Hb levels of 1.453 g/dL indicates that the consumption of dragon fruit juice was able to improve the hemoglobin status of pregnant women. These

findings suggest that dragon fruit can be used as an effective non-pharmacological alternative therapy in supporting the management of anemia during pregnancy.

The increase in hemoglobin levels in the dragon fruit juice intervention group was thought to be influenced by the active compounds contained in red dragon fruit (*Hylocereus polyrhizus*). Dragon fruit contains iron, vitamin C, vitamin B1, vitamin B2, vitamin B3, folate, and antioxidants such as flavonoids and betalains that play a role in erythrocyte formation and hemoglobin synthesis. The iron content in dragon fruit helps in hemoglobin formation, while vitamin C increases iron absorption in the small intestine, thereby increasing iron availability in the body. In addition, vitamin B complex and folate support the maturation process of red blood cells in the bone marrow. Antioxidants in dragon fruit also help reduce oxidative stress that may affect erythrocyte membrane stability Sari, Harahap, & Juliani, 2021; Mardiana, Meldawati, & Hidayah, 2023; Rahmiati, & Nulhakim, 2023).

The results of this study are consistent with previous research showing that the administration of dragon fruit to third-trimester pregnant women increased the average Hb level from 9.62 g/dL to 11.64 g/dL with a p-value = 0.001 (Aulya, Silawati, & Margareta, 2021). Other studies also stated that dragon fruit consumption effectively increased hemoglobin levels in pregnant women with anemia because its high vitamin C and iron content support hemoglobin formation (Herlina, Haiyanti, & Lestari, 2024). Similar studies also reported that dragon fruit consumption effectively increased hemoglobin levels in pregnant women with mild anemia due to its iron

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and vitamin C content, which support hemoglobin synthesis (Megasari & Pitriani, 2021).

Based on the results of the study, the researchers assume that regular consumption of dragon fruit juice can serve as an effective complementary therapy in increasing hemoglobin levels among pregnant women with anemia. Juice form is considered to facilitate nutrient absorption compared to consuming the fruit directly, allowing iron and vitamin C to be absorbed more quickly by the body. In addition, the sweet and refreshing taste of dragon fruit may improve compliance among pregnant women compared to Fe tablet supplementation alone, which often causes side effects such as nausea and constipation. Therefore, dragon fruit juice can be considered a safe, accessible, and economical non-pharmacological intervention to help increase hemoglobin levels in pregnant women with anemia.

Based on the results of the study in the red guava juice intervention group, the mean hemoglobin (Hb) level of pregnant women before receiving red guava juice intervention was 10.367 g/dL and increased to 12.300 g/dL after 14 days of intervention. Statistical analysis using the paired t-test showed a p-value of 0.000 (<0.05), indicating that the administration of red guava juice had a significant effect on increasing hemoglobin levels among pregnant women with anemia. The average increase in Hb levels of 1.933 g/dL indicates that red guava juice has good effectiveness in improving anemia conditions among pregnant women. These results also indicate that non-pharmacological therapy through red guava juice administration can serve as a supportive intervention in improving the health status of pregnant women, especially those with iron deficiency anemia.

The increase in hemoglobin levels in the red guava juice intervention group was thought to be influenced by the active compounds contained in red guava (*Psidium guajava*). Red guava is known to contain high amounts of vitamin C, approximately 80–100 mg per 100 grams of fruit, which functions to increase non-heme iron absorption in the small intestine. Vitamin C helps convert ferric iron into ferrous iron so that iron is more easily absorbed by the body and utilized in the process of hemoglobin synthesis. In addition to vitamin C, red guava also contains iron, folate, vitamin A, vitamin B complex, flavonoids, lycopene, and antioxidants that support erythrocyte formation and maintain red blood cell

membrane stability. Folate plays a role in DNA formation and erythrocyte maturation, while antioxidants help reduce oxidative stress that may interfere with red blood cell production. The combination of these active compounds makes red guava potentially effective in optimally increasing hemoglobin levels in pregnant women with anemia (Apriyanti & Andriani, 2019; Chunaeni, Lusiana, & Martanti, 2020; Wahyuntari & Wahtini, 2020).

The results of this study are in line with previous studies stating that the administration of 200 ml of red guava juice per day for 14 days significantly increased the average Hb levels of pregnant women from 11.26 g/dL to 12.61 g/dL with a p-value <0.05. The study explained that the vitamin C content in red guava increased the effectiveness of iron absorption from Fe supplementation (Yati et al., 2020). The results of this study are in line with previous studies stating that the administration of 200 ml of red guava juice per day for 14 days significantly increased the average Hb levels of pregnant women from 11.26 g/dL to 12.61 g/dL with a p-value <0.05. The study explained that the vitamin C content in red guava increased the effectiveness of iron absorption from Fe supplementation (Suhartati, Isnovinda, & Rahmayani, 2021).

The researchers assume that regular consumption of red guava juice can increase hemoglobin levels in pregnant women because its vitamin C and iron content work synergistically to improve iron absorption and erythrocyte formation. The combination of red guava juice consumption and Fe tablet supplementation may provide more optimal results in increasing hemoglobin levels compared to Fe tablet supplementation alone. Therefore, red guava juice can be considered a safe, accessible, economical, and effective complementary therapy in helping manage anemia among pregnant women.

Based on the results presented in Table 3, both interventions, namely dragon fruit juice and red guava juice administration, were proven to be effective in increasing hemoglobin (Hb) levels among pregnant women with anemia. In the dragon fruit juice group, the mean Hb level after the intervention increased to 11.640 g/dL, while in the red guava juice group, the mean Hb level increased more significantly to 12.300 g/dL. Statistical analysis showed a p-value of 0.000 (<0.05), indicating that there was a significant difference in effectiveness between the two interventions. The increase in Hb levels in the red

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guava juice group was higher than in the dragon fruit juice group, therefore it can be concluded that red guava juice was more effective in increasing hemoglobin levels among pregnant women with anemia.

Red guava is considered more effective in increasing Hb levels because it contains much higher levels of vitamin C compared to dragon fruit. Vitamin C plays an important role in enhancing non-heme iron absorption in the intestine by converting ferric iron into ferrous iron, allowing iron to be more easily absorbed by the body and utilized in the erythropoiesis process (Butt, Altemimi, Younas, Butt, Jalal, Bhatti, & Aadil, 2025). In addition, red guava also contains iron, folate, vitamin A, flavonoids, and antioxidants that support erythrocyte formation and hemoglobin synthesis. The vitamin C content in red guava reaches approximately 80–100 mg per 100 grams of fruit (Mayasari, Sari, & Febrinasari, 2023). Although dragon fruit contains iron and antioxidants that support hemoglobin formation, iron absorption is more optimal in red guava because of its high ascorbic acid content. This condition resulted in a greater increase in Hb levels in the red guava juice group compared to the dragon fruit juice group.

The researchers assume that the difference in effectiveness between dragon fruit juice and red guava juice is influenced by differences in vitamin C content and the body's ability to absorb iron. Red guava juice provides a greater increase in Hb levels because its very high vitamin C content is able to optimize iron absorption more quickly and effectively. Regular consumption of red guava juice may also improve pregnant women's adherence to non-pharmacological therapy because it has a fresh taste and is easily accepted. Nevertheless, dragon fruit juice still provides benefits in helping increase Hb levels because it contains iron and antioxidants that support erythrocyte formation.

CONCLUSION

The interventions of dragon fruit juice and red guava juice were proven to be effective in increasing hemoglobin (Hb) levels among pregnant women with anemia at the Kronjo Community Health Center, Tangerang Regency, in 2025. In the dragon fruit juice group, the mean Hb level increased from 10.187 g/dL to 11.640 g/dL, with an increase of 1.453 g/dL, and the statistical test results showed a p-value = 0.000

(<0.05). Meanwhile, in the red guava juice group, the mean Hb level increased from 10.367 g/dL to 12.300 g/dL, with an increase of 1.933 g/dL, and the p-value was 0.000 (<0.05). The results of the study showed that both types of juice had a significant effect on increasing hemoglobin levels among pregnant women with anemia. However, red guava juice was proven to be more effective than dragon fruit juice in increasing Hb levels among pregnant women. The high content of vitamin C and iron in red guava is believed to play a role in enhancing iron absorption and accelerating hemoglobin formation.

SUGGESTION

Pregnant women with anemia are advised to increase their consumption of foods and beverages containing iron and vitamin C, one of which is through the regular consumption of red guava juice and dragon fruit juice as complementary non-pharmacological therapy. Health workers can provide education regarding the benefits of consuming red guava juice and dragon fruit juice as complementary therapies to help increase hemoglobin levels.

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