

# Effectiveness of Giving Dragon Fruit on Increasing Hemoglobin Levels in Pregnant Women with Mild Anemia at Jakarta Harbor Hospital in 2024

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Received: July 02, 2024

Revised: August 20, 2024

Accepted: September 25, 2024

Published: September 30, 2024

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DOI: [10.29303/jppipa.v10i9.8896](https://doi.org/10.29303/jppipa.v10i9.8896)

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**Abstract:** Research conducted at Jakarta Harbor Hospital in 2024 aimed to evaluate the effectiveness of dragon fruit in increasing hemoglobin levels in pregnant women with mild anemia. Anemia is a common condition at the hospital, affecting around 30% of pregnant women in 2022. The study involved 36 third-trimester pregnant women with anemia. Hemoglobin levels were measured using a digital Hb meter (Quick Check), blood lancet, and strip. Data were analyzed using univariate and bivariate methods. The paired sample t-test was applied if the data followed a normal distribution, while the Wilcoxon test was used for non-normal distributions. After 14 days of administering dragon fruit, the study found an average increase in hemoglobin levels of 0.538 g/dL. This indicates that dragon fruit is effective in raising hemoglobin levels in pregnant women with mild anemia.

**Keywords:** Dragon fruit; Hemoglobin levels; Pregnant women

## Introduction

State According to World Health Organization (WHO), in the context of pregnancy, anemia is defined as a condition in which levels hemoglobin (Hb) in pregnant women is less than 11 g/dL. However, Centers for Disease Control and Prevention (CDC) defines anemia in pregnancy with slightly different criteria. According to the CDC, anemia in the first and third trimesters is defined as an Hb level of less than 11 g/dL, in the second trimester it is defined as an Hb level of less than 10.5 g/dL, and after delivery it is defined as an Hb level of less than 10 g/dL (WHO, 2018). In developed countries, it is estimated that around 13% of women experience anemia. In Indonesia, the results of Basic Health Research (Riskesdas) in 2020 show that the percentage of anemia in pregnant women reached 37.1%. However, the results of the Household Health Survey (SKRT) show a decrease in the prevalence of iron deficiency anemia in Indonesia from 63.5% in 1995 to 40.1% in 2019, and then down to 24.5% in 2021

(Indonesian Ministry of Health, 2022). The incidence of anemia in pregnant women in the first trimester is 20%, in the second trimester it is 70%, and in the third trimester it is also 70%. The main cause of the high incidence of anemia in the first trimester of pregnancy is because pregnant women tend to experience greater fatigue in early pregnancy. In the second and third trimesters of pregnancy, the blood volume in a woman's body increases by approximately 35%, which is equivalent to 450 mg of iron needed to produce red blood cells (Okvitasari, 2021).

Anemia is a medical condition characterized by a low number of red blood cells or a lack of hemoglobin in the blood. One group that is vulnerable to anemia is pregnant women. During pregnancy, the body requires more blood to meet the needs of the developing fetus, and a lack of iron or other nutrients can cause anemia in pregnant women (Means, 2020). Factors that cause anemia in pregnant women are generally related to iron deficiency. This can occur due to inadequate iron intake, iron malabsorption due to certain conditions, increased

## How to Cite:

Futriani, E. S., Wijayanti, T. P., Susanti, T., Toyibah, Ernawati, & Astuti, E. (2024). Effectiveness of Giving Dragon Fruit on Increasing Hemoglobin Levels in Pregnant Women with Mild Anemia at Jakarta Harbor Hospital in 2024. *Jurnal Penelitian Pendidikan IPA*, 10(9), 6631-6637. <https://doi.org/10.29303/jppipa.v10i9.8896>

iron requirements during pregnancy, as well as bleeding during pregnancy, childbirth, and postpartum. Anemia in pregnant women can have a negative impact on the health of the mother and fetus. For mothers, anemia can cause fatigue, decreased endurance, increased risk of bleeding during childbirth, and even complications such as preeclampsia. Meanwhile for the fetus, maternal anemia can increase the risk of low birth weight, premature birth, perinatal death, and can inhibit fetal growth and development, as well as increase the risk of neurological disorders in the child (Means, 2020).

Data from the medical records of Jakarta Harbor Hospital shows that anemia in pregnant women is a case that is quite frequently encountered. In 2022, around 30% of the total pregnant women visiting Jakarta Harbor Hospital will be diagnosed with anemia. This figure is quite high when compared with the prevalence of anemia in pregnant women nationally, which reached 48.9% in 2020. Red dragon fruit, with various nutritional contents such as vitamin C, vitamin B1 (thiamine), vitamin B2 (riboflavin), carbohydrates, protein, antioxidants, fiber and iron, has been in the spotlight in research related to increasing hemoglobin (Hb) levels and erythrocytes in pregnant women who suffer from anemia. Iron is needed in the production of hemoglobin and erythrocytes, while vitamin C in red dragon fruit can increase iron absorption from the digestive tract (Nurhasanah, 2019). Research by Desmariyenti et al. (2023) explains that Pregnant women suffering from mild and moderate anemia have different hemoglobin levels, with an average hemoglobin level of 10,280 g/dl before being given dragon fruit juice and a mean hemoglobin level after being given dragon fruit juice of 11,580 g/dl. The mean difference was up to 1.3 g/dl. The research results showed the effectiveness of dragon fruit juice in increasing the hemoglobin levels of pregnant women with a p value <  $\alpha$  (0.001 < 0.05).

From the results of a preliminary study on 5 pregnant women with mild anemia, it can be concluded that giving dragon fruit for 2 weeks can increase hemoglobin levels by an average of 0.3 g/dL in each subject. These results show the potential effectiveness of giving dragon fruit in increasing hemoglobin levels in pregnant women with mild anemia. However, this study is still preliminary with a limited sample size. To determine the effectiveness of giving dragon fruit more comprehensively, further research is needed with a larger sample size and a stronger research design. Therefore, researchers are interested in conducting further research, namely "The Effectiveness of Giving Dragon Fruit on Increasing Hemoglobin Levels in Pregnant Women with Mild Anemia at Jakarta Harbor Hospital in 2024"

## Method

This research was conducted to determine the effectiveness of giving dragon fruit on increasing hemoglobin levels in pregnant women with mild anemia at the Jakarta Harbor Hospital in 2024. It was carried out for 3 months from April to June 2024. This research is a research study. Quasy experiment with the group giving dragon fruit. The independent variable in this research is the provision of dragon fruit, the dependent variable is content Hemoglobin (HB) Pregnant Women. The total number of respondents in this study was 36 respondents based on data from third trimester pregnant women who experienced anemia, digital Hb meter (Quick check), blood lancet, strip. To increase HB levels, pregnant women should be given 100 grams of dragon fruit/day regularly during pregnancy to increase iron in pregnant women. Consumed consecutively for 14 days in the morning and evening. Data analysis was carried out univariately and bivariately, to determine the effectiveness of dragon fruit on the hemoglobin (HB) levels of pregnant women experiencing anemia using the paired sample t test if the distribution was normal and if it was not distributed using the SPSS version 25 statistical Wilcoxon test. See figure 1.

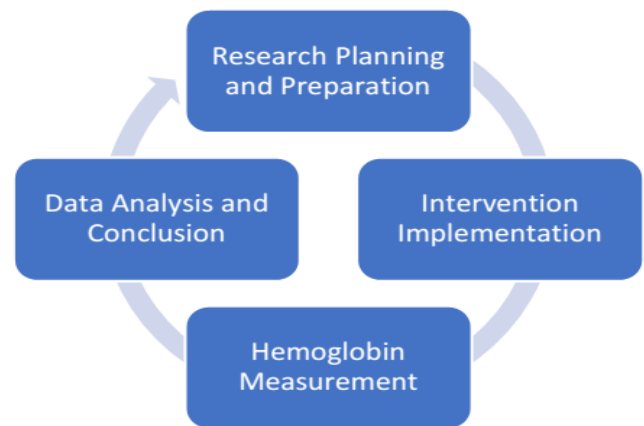


Figure 1. Stage of the research

## Result and Discussion

### Results

#### Univariate Data Analysis

*Frequency Distribution of Average Hemoglobin (Hb) Levels of Pregnant Women Who Experience Anemia Before and After Being Given Dragon Fruit to Anemic Pregnant Women at Jakarta Harbor Hospital in 2024*

Based on table 1, it can be seen that the hemoglobin level assessment before giving dragon fruit was given an average hemoglobin level value of 9.856, and a standard deviation of 0.6843 with a minimum hemoglobin level assessment of 9.0 gr/dl and a maximum of 10.9 gr/dl. Meanwhile, after being given dragon fruit, the average

hemoglobin level value was 10.394, and the standard deviation was 0.7211 with a minimum hemoglobin level assessment of 9.3 gr/dl and a maximum of 11.8 gr/dl.

**Table 1.** Average Hemoglobin (Hb) Levels of Pregnant Women Who Have Anemia Before and After Being Given Dragon Fruit

Assessment of Hemoglobin Levels	N	Mean	standard deviation	Min	Max
Before being given Dragon Fruit	36	9.856	0.6843	9.0	10.9
After being given Dragon Fruit		10.394	0.7211	9.3	11.8

*Difference Average Hemoglobin (HB) Levels Before and After Giving Dragon Fruit to Anemic Pregnant Women at Jakarta Harbor Hospital in 2024*

Based on table 2, it can be seen that the assessment of hemoglobin levels carried out for 14 days given dragon fruit resulted in an average difference in increase in hemoglobin levels, namely 0.54 gr/dl.

**Table 2.** Difference Average Hemoglobin (HB) Levels Before and After Giving Dragon Fruit to Anemic Pregnant Women at Jakarta Harbor Hospital in 202

Assessment of Hemoglobin Levels	N	Mean	Difference
Before being given dragon fruit	36	9.856	0.54
After being given dragon fruit		10.394	

*Normality Test Results.*

Before carrying out the bivariate analysis, a normality test was first carried out on the pretest and posttest measurements of dragon fruit administration to obtain an increase in hemoglobin levels. The data normality test was carried out using uji Shapiro wilk. This test aims to determine that changes in average hemoglobin levels occur not due to variations in respondents, but because gift of dragon fruit. If the p value > 0.05 then the data is homogeneous.

**Table 3.** Normality Test Results

	Kolmogorov - Smirnov statistics		Df themselves		Shapiro - wilk statistics		df themselves.	
Before	.153	36	.033	.893	36	.002		
After	.101	36	.200*	.954	36	.144		

Based on table 3, the results of the normality test assessment show that the Shapiro - Wilk value is 0.002 (before) and 0.144 (after), so the Shapiro - Wilk value with a P-value < 0.05 means it can be concluded that the normality test is not normally distributed. The results obtained are not normal, so the normality test is used non-parametric statistics (Wilcoxon test) as an

alternative to the paired sample T test if the research data is not normally distributed.

*Bivariate Analysis Results*

Based on the Wilcoxon test, the majority of the average values from 36 respondents were positive, namely an increase in hemoglobin levels with an average of 18.50 and a sum of rank of 666.00. There was no negative decrease in ranks or reduction in hemoglobin levels and ties values (assessment fixed before and after. The research results are known as Asymp. Sig (2 - Tailed) has a value of 0.000 because 0.000 < 0.05, it can be concluded that the hypothesis is accepted. This means that there is effectiveness of giving dragon fruit in increasing hemoglobin levels in pregnant women with mild anemia at the Jakarta Harbor Hospital in 2024.

**Table 4.** The Effect of Giving Dragon Fruit on Increasing Hemoglobin Levels in Pregnant Women with Mild Anemia at Jakarta Harbor Hospital in 2024

Giving Dragon Fruit	N	Mean Rank	Sum Of Rank	Sig. (2-tailed)
After	Negative Ranks	0	0.00	0.00
Before	Positive Ranks	36	18.50	666.00
	Ties	0		18.50
Total		36		

*Discussion*

*Description of Dragon Fruit on Hemoglobin Levels*

The assessment of hemoglobin levels was carried out for 14 days when given dragon fruit and obtained an average difference in increase in hemoglobin levels, namely 0.538 gr/dl. Iron is an important component in the formation of hemoglobin, the oxygen-carrying protein in red blood cells. Iron deficiency can cause anemia, a condition in which the body does not have enough healthy red blood cells to carry oxygen throughout the body. Vitamin C helps the body absorb iron more optimally (Hawiset et al., 2022; Mima, 2022). Regular consumption of dragon fruit can help increase Hb levels and prevent anemia (Putri, 2020). According to Means (2020), iron, an important component in the formation of hemoglobin, helps the body carry oxygen to all organs. Iron deficiency can cause anemia. Dragon fruit contains around 1.16 mg of iron per 100 grams.

Dragon fruit is a relatively popular newcomer, this can be due to its exotic appearance, refreshing sweet taste and the health benefits it contains. Dragon fruit plants originate from Mexico, Central America and South America, but with modern developments they have been cultivated in various countries such as Indonesia (Chendriany et al., 2020). There are four types of dragon fruit, namely red flesh dragon fruit, white flesh dragon fruit, super red dragon fruit and yellow

flesh dragon fruit. The four types of dragon fruit have their own advantages and have different characteristics. Red dragon fruit flesh has a higher antioxidant content than white dragon fruit. Red dragon fruit flesh contains many antioxidants, one of which is phenol and ascorbic acid which have the power to capture metals so that they can capture iron ions which cause degenerative diseases. (Usman et al., 2019).

Dragon fruit contains a number of nutrients that can help increase hemoglobin levels in the blood. One of the main ingredients is iron. Iron plays an important role in the formation of hemoglobin, which is a protein in red blood cells that binds and transports oxygen throughout the body. Apart from iron, dragon fruit is also rich in vitamin C. Vitamin C helps increase the absorption of iron in the body, so it will be more effective in increasing hemoglobin levels (Chendriany et al., 2020). Dragon fruit also contains folate, which is vitamin B9 which is needed in the process of forming red blood cells. With this complete nutritional content, regular consumption of dragon fruit can help overcome the problem of anemia or lack of blood and help increase hemoglobin levels in the body (Astria et al., 2023). Based on the results of research conducted, it can be concluded that regular consumption of dragon fruit for 14 days has proven effective in increasing hemoglobin levels. Research shows an increase in hemoglobin levels of 0.538 gr/dl in the group that consumed dragon fruit.

This is in accordance with the theory regarding the nutritional content of dragon fruit which can support increasing hemoglobin levels. Dragon fruit is rich in iron, vitamin C and folate - nutrients that play an important role in the formation of red blood cells and increasing hemoglobin levels. The iron in dragon fruit helps produce hemoglobin, which is the main component of red blood cells. Meanwhile, vitamin C helps increase iron absorption in the body. Folate is also needed in the process of forming red blood cells. These findings show that dragon fruit can be a good food alternative to overcome the problems of anemia and blood deficiency. Supporting factors Dragon fruit has the potential to support increased hemoglobin levels because it is rich in vitamin C, which helps the absorption of iron from food. Iron is an important component in the formation of hemoglobin. Apart from that, dragon fruit is also rich in antioxidants which protect red blood cells from damage caused by free radicals, as well as fiber which helps the absorption of iron and other nutrients. Dragon fruit also contains vitamin B12, which plays an important role in the formation of red blood cells, including hemoglobin. However, it is important to remember that dragon fruit cannot replace medical treatment for anemia. If you experience anemia, consult a doctor to get the right diagnosis and treatment.

Factors may hinder its effectiveness. The oxalic acid content in dragon fruit can bind iron and inhibit its absorption, thereby reducing its effectiveness in increasing hemoglobin levels. In addition, the iron in dragon fruit may not be easily absorbed by the body because its form is not easily accessible. Interactions with certain types of drugs, such as certain antibiotics, can also inhibit iron absorption. Certain health conditions, such as celiac disease or Crohn's disease, can interfere with iron absorption and reduce the effectiveness of dragon fruit. Finally, consuming small amounts of dragon fruit may not have a significant effect on hemoglobin levels. For optimal results, a combination of a balanced diet and a healthy lifestyle is needed. Although dragon fruit has the potential to support increased hemoglobin levels, an effective solution requires a comprehensive approach. Consuming dragon fruit with foods rich in iron, such as red meat and nuts, as well as sources of vitamin C, such as oranges and guava, can increase iron absorption and the effectiveness of dragon fruit. Avoid consuming dragon fruit together with certain medications that can inhibit iron absorption. Consuming sufficient amounts of dragon fruit is also important. Remember that dragon fruit is not the sole solution for anemia (Dlamini et al., 2019; Saini et al., 2022; Singhal et al., 2022).

#### *Effectiveness of Giving Dragon Fruit on Increasing Hemoglobin Levels in Pregnant Women with Mild Anemia at Jakarta Harbor Hospital in 2024*

The research results are known as Asymp. Sig (2 - Tailed) has a value of 0.000 because  $0.000 < 0.05$ , it can be concluded that the hypothesis is accepted. This means that there is effectiveness of giving dragon fruit in increasing hemoglobin levels in pregnant women with mild anemia at the Jakarta Harbor Hospital in 2024. The research is similar to Chendriany et al. (2020), the results of the study show that there is a significant difference before and after being given dragon fruit using testing using t test where the data obtained was that the average Hb level in the Intervention group was 11.107 with a standard deviation of 1.1392, while in the Control group the average value was 9.120 with a standard deviation of 1.4473, this indicates that giving dragon fruit is effective in increasing Hb levels in pregnant women. The research is similar to Fitriasnani et al. (2020), statistical test results using Paired Sampel T Test obtained P value =  $0.000 < \alpha 0.05$ , which means there is an effect of dragon fruit consumption (*Hylocereus*) on hemoglobin in female students with anemia. Providing dragon fruit is expected to increase hemoglobin levels in female students with anemia at SMAN 5 Kediri and maintain daily food intake, especially by paying attention to the type of nutrients, including iron, so that the incidence of



anemia is resolved and health levels increase (Allai et al., 2023; Hu et al., 2024; Ramírez-Melo et al., 2022).

Similar research with Sari et al. (2023) shows that giving dragon fruit juice affects hemoglobin levels in adolescent girls (0.006). Conclusion: Giving 200 grams of dragon fruit juice per day for 10 consecutive days increased hemoglobin levels by 1.1 g/dl. Based on the similarity of the current research results with previous ones, where dragon fruit is a type of fruit that can increase hemoglobin levels, it can be concluded that dragon fruit contains nutrients that can contribute to increasing hemoglobin levels in the blood. Dragon fruit contains quite a lot of iron, which is the main component in the formation of hemoglobin and plays an important role in transporting oxygen in the blood (Martínez-Rodríguez et al., 2022; Saud et al., 2024; Yuan et al., 2024). Apart from that, dragon fruit is also rich in vitamin C which helps in the absorption of iron, and contains folate and copper which are useful for enzyme activity involved in hemoglobin synthesis. Giving dragon fruit to pregnant women with mild anemia has the potential to support increased hemoglobin levels because it is rich in vitamin C which helps the absorption of iron, antioxidants which protect red blood cells, fiber which helps the absorption of iron and other nutrients, and vitamin B12 which is important in formation of red blood cells. The inhibiting factor is that dragon fruit is not the sole solution for treating anemia. Apart from consuming dragon fruit, pregnant women with mild anemia can increase hemoglobin levels by consuming foods rich in iron and vitamin C, and living a healthy lifestyle. To obtain the effectiveness of consuming dragon fruit in increasing hemoglobin levels, a comprehensive approach needs to be taken. Avoid consuming dragon fruit together with certain medications that can inhibit iron absorption. Consuming sufficient amounts of dragon fruit is also important.

## Conclusion

Based on the results of the research and discussions that have been carried out, several conclusions can be drawn. First, the assessment of hemoglobin levels before the dragon fruit intervention was given showed an average hemoglobin level of 9.856 gr/dl with a standard deviation of 0.6843. The minimum hemoglobin level value was recorded at 9.0 gr/dl and the maximum was 10.9 gr/dl. After the intervention was carried out, namely by administering dragon fruit, the average hemoglobin level increased to 10.394 gr/dl with a standard deviation of 0.7211. Assessment of hemoglobin levels after intervention showed a minimum value of 9.3 gr/dl and a maximum value of 11.8 gr/dl. Second, dragon fruit was given for 14 days, and the results showed an increase in hemoglobin levels with an

average difference of 0.538 gr/dl. This shows that giving dragon fruit has a positive effect on increasing hemoglobin levels in pregnant women with mild anemia. Third, the Wilcoxon test results showed that the majority of respondents experienced an increase in hemoglobin levels with positive ranks, namely an average of 18.50 and a sum of ranks of 666.00. There was no decrease (negative ranks) or decrease in hemoglobin levels, and there were no tie values, which means there was no change in several respondents before and after the intervention. Finally, the analysis results show the value of Asymp. Sig (2-tailed) is 0.000, which is smaller than 0.05. Thus, the alternative hypothesis is accepted, which means that giving dragon fruit is effective in increasing hemoglobin levels in pregnant women with mild anemia at the Jakarta Harbor Hospital in 2024. These findings provide evidence that dragon fruit can be an effective solution in treating mild anemia in pregnant women, especially in the context of significantly increased hemoglobin levels.

## Acknowledgments

We would like to express our deepest gratitude to our advisor who has guided us throughout the research process and to the respondents who have made significant contributions to the success of this study. Your support, guidance, and participation have been invaluable, and we greatly appreciate your effort and dedication. Thank you for your continuous encouragement and for making this research possible.

## Author Contributions

The following statements should be used Conceptualization ESF, TPW, TS, T, E, EA contributed to the data collection process, data processing, article writing.

## Funding

This research was funded by personal funds.

## Conflicts of Interest

The authors declare no conflict of interest.

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