



Effectiveness of Giving Dragon Fruit and Fe Tablets on Increasing Hemoglobin Levels in Pregnant Women

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Abstract

In 2018, the WHO reported that 41.8% of maternal deaths in developing countries were associated with anemia. Increasing hemoglobin levels can be supported by consuming fruits rich in iron, folic acid, and vitamin C, with dragon fruit being one of the beneficial options. This study aimed to assess the effectiveness of dragon fruit and Fe tablets in raising hemoglobin levels among pregnant women in Puluhan Village, Trucuk District, Klaten Regency. Utilizing a literature review approach, the study involved searches across PubMed and Google Scholar, using keywords such as "Dragon Fruit Juice," "Fe Tablets," "Hb Levels," and "Pregnancy." From 2020 to 2023, four relevant journals were identified and analyzed. Participant characteristics showed that most were aged 20-35 years (80%), with a high school education level (35%), predominantly homemakers (65%), multiparous (50%), and had a gestational age of less than 37 weeks (65%). The average Hb level before receiving dragon fruit and Fe tablets was 11.40 g%, which rose to 11.72 g% after the intervention. Thus, the provision of dragon fruit and Fe tablets was found to have a positive effect on hemoglobin levels in pregnant women.

Keywords:

Dragon Fruit,
Fe,
Hemoglobin Levels,
Pregnant Women.

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INTRODUCTION

The success of maternal health efforts can be assessed using the Maternal Mortality Rate (MMR) indicator. Each pregnancy carries the potential for complications that may pose risks to both the mother and baby, whether in low- or high-risk pregnancies (Chou et al., 2018). Data from the World Health Organization (WHO) in 2022 indicates that 41.8% of maternal deaths in developing countries are related to anemia during pregnancy. Anemia is one of the most common pregnancy complications, with prevalence rates ranging from 20% to 89%, using an Hb level of 11 g% as the baseline. A national and regional survey in Morocco also indicated that anemia remains a significant health issue, especially for women, with the prevalence of iron deficiency anemia at 37.2% among pregnant women and 32.6% among women of reproductive age (Kemenkes, 2023).

The 2022 Indonesian Basic Health Research (Riskesdas) report shows that 48.9% of pregnant women in Indonesia experience anemia, with 84.6% of cases occurring in the 15-24 age group (Kemenkes, 2023). In Central Java Province, anemia prevalence is 57.1%, with the highest incidence in third-trimester pregnant women, and in Klaten Regency, anemia prevalence among pregnant women is 9.19% (IHME, n.d.). Anemia is characterized by a reduced number of red blood cells (erythrocytes) or hemoglobin (Hb) mass in the blood, impairing the body's ability

to carry oxygen (Astuti & Ertiana, 2018). Anemia during pregnancy can have adverse effects during pregnancy, childbirth, and the postpartum period, such as restricted fetal growth, low birth weight, and fetal death. Labor complications can include prolonged labor and bleeding, while postpartum recovery may be prolonged (Astri, n.d.).

Factors contributing to anemia include low intake of iron and other nutrients such as vitamins A, C, folic acid, riboflavin, and B12. Hemoglobin is an iron-containing protein with a high oxygen-binding capacity, giving blood its red color. In cases of anemia, individuals often exhibit pale skin due to the lack of oxygenated blood (Putri & Komala, 2022). Efforts to increase hemoglobin levels and reduce anemia incidence involve regular Fe tablet consumption and a balanced diet, particularly foods high in iron and vitamin C, such as green leafy vegetables and fruits like dragon fruit (Sulistiari et al., 2018).

Dragon fruit, widely cultivated in Indonesia, benefits pregnant women by supporting fetal growth and development and fulfilling maternal nutritional needs (Mardiana et al., 2023). Iron exists in two forms: heme and non-heme; red meat contains about 40% heme iron and 60% non-heme iron. According to Soleha et al. (2020), consuming dragon fruit can increase hemoglobin levels in pregnant women by 1.82 g% with a daily intake of 250 g for 14 days. Research by Mardiana et al. (2023) found a significant increase in hemoglobin levels before and after supplementation with iron tablets and dragon fruit, with a p-value of 0.000, indicating a significant effect with a 1.1-fold increase in Hb levels at a 95% confidence level. Astri (n.d.) also observed a significant effect of dragon fruit juice on Hb levels in both treatment and control groups. Similarly, a study by Herlina et al. (2024) reported an average Hb level increase in the intervention group with a p-value of <0.05, indicating that dragon fruit juice and Fe tablets effectively raise Hb levels in pregnant women.

The researcher chose to study dragon fruit because it is delicious, readily available, and affordable. Based on a preliminary study conducted on January 28, 2024, on pregnant women receiving integrated antenatal care (ANC) at Trucuk I Community Health Center in 2023, it was found that in the first trimester, 7.5% had Hb levels of 9-10 g/dL, and 1.3% had Hb levels of 7-8 g/dL. In the second trimester, 26.3% had Hb levels of 9-10 g/dL, and 1.6% had Hb levels of 7-8 g/dL. In the third trimester, 72.7% had Hb levels of 9-10 g/dL, and 7.5% had Hb levels of 7-8 g/dL. In January 2024, pregnant women in Puluhan Village who received ANC showed that in the first trimester, there were no cases of anemia, while in the second trimester, 6.25% had Hb levels of 9-10 g/dL, and 12.5% had Hb levels of 10-11 g/dL. The preliminary data also revealed that pregnant women relied on iron supplements from midwives to address low Hb levels and were unaware of the benefits of dragon fruit for increasing Hb levels.

Low Hb levels among pregnant women can also result from improper Fe tablet consumption. Razfi (2020) found that low Hb levels are influenced by factors such as correct methods for Fe tablet intake, including timing and food pairing for optimal iron absorption. Supporting this, Fitria Sari (2023) reported that knowledge of appropriate Fe tablet intake methods, including timing and dietary factors aiding iron absorption, was categorized as good (15.4%), adequate (64.1%), and poor (20.5%). Based on this background, the researcher was motivated to conduct a study titled "Literature Review: The Effectiveness of Dragon Fruit and Fe Tablet Supplementation in Increasing Hemoglobin Levels Among Pregnant Women."

METHOD

This study uses a method in the form of a literature review study that involves searching for journal data based on the internet. The two data based used in this study are PubMed and Google Scholar. Search with the keywords "Dragon Fruit Juice", "Fe Tablets", "Hb Levels", "Pregnancy". The articles obtained in conducting the search were 8 relevant journals from 2020-2023.

RESULT AND DISCUSSION

Table 1. Results of Literature Review

Researchers and Years	Title	Respondents	Treatment Procedure	Findings	Treatment	Control
Mellyani & Mutiarami Dahlan (2022)	The Effect of Dragon Fruit Juice on Hemoglobin Levels in Pregnant Women in the Third Trimester	The sample in this study consisted of 30 respondents consisting of 15 control groups and 15 treatment groups.	Blood sampling was conducted twice before dragon fruit juice administration on day 1 and after dragon fruit juice administration on day 15. The research instrument consisted of an observation sheet and GCHb Easy Touch to measure hemoglobin levels before and after the intervention.	Research Results: The Hb level value in the treatment of 9.8gr/dL became 11.9gr/dL, in the control group 10gr/dL became 10.4gr/dL. There is an effect of giving dragon fruit juice on Hb levels before and after in the treatment and control groups. There is a difference in the treatment and control groups that get the same value, namely $p = 0.000$ (Blood sampling was carried out 2x before giving dragon fruit juice on the 1st day and after giving dragon fruit juice on the 15th day.	in the control group and the treatment group. The dragon fruit juice was given as much as 200cc a day.
Soleha et al. (2020)	Giving Dragon Fruit Juice Affects Hemoglobin Levels in Pregnant Women.	Sample of 18 people.	Dragon fruit juice was given until the 7th day and then Hb levels were measured.	Results: The results of the study showed that the average value of hemoglobin levels before giving dragon fruit juice was 9,761 and a standard deviation of 0.5304. The average value of hemoglobin levels on the 15th day of giving dragon fruit juice was 11,583 and a standard deviation of 0.6888. Conclusion: There is an Effect of Giving Dragon Fruit Juice on Increasing Hb Levels in Pregnant Women (p value $0.000 < 0.05$).	Dragon fruit juice.	There isn't any.
Mardiana et al. (2023)	Effectiveness of Dragon Fruit Consumption and Fe on Increasing Hemoglobin Levels in Pregnant Women with Anemia.	The sample in this study was 30ibu hamil which was divided into 2 groups, namely the intervention group and the control group, each group consisting of 15 pregnant women using purposive sampling techniques in the work area at the Awayan Health Center UPTD.	Instruments used are observation sheets to view and record all data obtained in the study. Observation sheets are adapted from research instruments that have been used in research (Wirdaningsih et al., 2020). The tools used in this study are Observation Sheets and Easy Touch brand digital Hb checkers. The instruments used are SOP (Standard Operating Procedure)	Research results Final levels of Hemoglobin in the intervention group were mostly not Anemic, totaling 14 people (93.33%), while the Hemoglobin levels in the control group were mostly Mild Anemia, totaling 9 people (29.97%). The study proved that there was a significant increase in hemoglobin levels between before and after being given blood-boosting tablets and additional dragon fruit	Dragon fruit and Fe	Not given

			sheets and informed consent.	where the p value = 0.000 and there was an effect of Hb levels after the intervention from the results of the 1.1-fold test with a confidence level of 95%.		
Sitepu & Hutabarat (2020)	The Effect of Dragon Fruit Juice on Changes in Blood Profile Levels in Pregnant Women with Anemia Who Receive Fe Tablet Supplementation	The population in this study was all pregnant women with anemia who received Fe tablet supplementation, a total of 76 people.	This study was conducted for 3 weeks with a sample size of 40 respondents. The intervention group was given dragon fruit juice and Fe tablets for 21 days and the control group only received F tablets. In this study, observations were conducted twice, before and after treatment.	This study was conducted for 3 weeks with a sample size of 40 respondents. The intervention group was given dragon fruit juice and Fe tablets for 21 days and the control group only received F tablets. In this study, observations were conducted twice, before and after treatment.		
Astriana et al. (2023)	The Effect of Dragon Fruit Juice on Hemoglobin Levels in Pregnant Women.	The sample in this study was all pregnant women who met the inclusion and exclusion criteria, totaling 15 respondents.	15 people	There is an effect on the Hemoglobin (HB) levels of pregnant women after being given Dragon Fruit juice. Pregnant women should often check their pregnancy since the first trimester of pregnancy so that it is quickly known if the mother experiences anemia during her pregnancy.	Giving dragon fruit	
Tusiana et al. (2021)	The Effect of Red Dragon Juice on Hemoglobin Levels in Pregnant Women in the Working Area of the Tri Karya Mulya Health Center UPT, Mesuji Regency in 2021.	Sample of 20 people.	Hb level Red dragon juice Hv level	Research Results The average Hb level before being given red dragon fruit juice in the working area of UPT Puskesmas Tri Karya Mulya was 10.4 g/dl and after being given red dragon fruit juice was 11.6 g/dl. There is an effect of red dragon fruit juice on hemoglobin levels in pregnant women in the third trimester in the working area of UPT Puskesmas Tri Karya Mulya with a p-value of 0.000.	Red dragon juice	
Sari et al. (2021)	The Effect of Dragon Fruit (Hylocereus Polyrhizus) on Hemoglobin	The total number of samples is 30 respondents.	Dragon fruit Hb levels Hb levels	The results of the Mann-Whitney test obtained a Sig.2-tailed value of 0.004 < 0.05, so it can be concluded that giving	Dragon fruit	There isn't any

	Levels in Pregnant Women AneMia.				dragon fruit juice can increase hemoglobin levels in pregnant women with anemia and is statistically significant.		
Chendriany et al. (2021)	The Effect of Giving Dragon Fruit Juice on Hb Levels in Third Trimester Pregnant Women with Anemia at the Taktakan Serang Health Center UPTD - Banten in 2020.	The sample in this study was 30 pregnant women, consisting of 15 pregnant women in the Control group and 15 pregnant women in the Intervention group.	Hb levels of dragon fruit juice Hb levels		The results of the study showed that there was a significant difference before and after being given dragon fruit juice testing using the t-test where the average Hb level data 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 juice is effective in increasing Hb levels in pregnant women.	Dragon fruit	There isn't any

Discussion

The literature review of four journal articles reveals that the intervention of dragon fruit juice and Fe tablet therapy significantly influences the increase in Hb levels in pregnant women. Ripe dragon fruit is rich in organic acids, protein, minerals like potassium, magnesium, calcium, iron, and vitamin C. Based on its chemical composition, which includes minerals, iron, and vitamin C, dragon fruit can be used to treat anemia. Ascorbic acid (vitamin C), folic acid, and protein are key factors that enhance non-heme iron absorption. Vitamin C can boost non-heme iron absorption by up to four times. Citric, malic, lactic, succinic, and tartaric acids can also enhance non-heme iron absorption under certain conditions. Vitamin C acts as a reducing agent, increasing iron absorption by reducing ferric iron to ferrous, making iron absorption more efficient and effective (Astriana et al., 2023).

One hundred grams of dragon fruit contains 0.16 mg of iron, while the daily iron requirement for pregnant women is 0.8 mg. This iron is converted into red blood cells. Dragon fruit contains high levels of iron and vitamins, particularly vitamin C, which aids in iron absorption during pregnancy. Therefore, dragon fruit is effective in helping to increase hemoglobin levels in pregnant women (Herlina et al., 2024). Consequently, regular consumption of dragon fruit juice over 14 days can promote hemoglobin, hematocrit, and erythrocyte formation. Dragon fruit contains the necessary nutrients for hemoglobin and blood cell formation. Apart from immunity benefits, the zinc content in dragon fruit, which is around 42% of the daily body requirement, minimally impacts platelet counts (Sitepu & Hutabarat, 2020). Consuming 250 g of dragon fruit daily for 1-14 days, along with regular Fe tablet intake, serves as an alternative to increase Hb levels in anemic pregnant women compared to those consuming only Fe tablets (Mardiana et al., 2023).

According to the researcher, consuming 200 g of dragon fruit juice once daily for 14 days resulted in increased hemoglobin levels. In this study, Hb levels in pregnant women were measured on day one before and on day 15 after consuming dragon fruit juice. This treatment led to a significant increase, as reflected in the higher average Hb levels post-treatment. This result is attributed to the respondents following the researcher's

recommendation to drink dragon fruit juice regularly for 14 days, along with a controlled diet, which aided in raising Hb levels. Dragon fruit contains iron for blood formation, vitamin B1 for temperature regulation, vitamin B2 to boost appetite, vitamin B3 to lower cholesterol, and vitamin C for iron absorption. Dragon fruit offers comprehensive nutrition necessary for the body, with its protein and vitamin content supporting body metabolism and enhancing hemoglobin levels (Mellyani & Mutiarami Dahlan, 2022).

The researcher noted that nutritional needs increase during pregnancy, supporting both the mother and baby. If insufficient, pregnant women may develop anemia, where healthcare professionals play a role in reducing maternal anemia by educating mothers on proper nutritional intake. Improved knowledge of iron-rich foods, especially dragon fruit, which can be consumed as juice with honey once daily, has been proven to increase Hb levels (Tusiana et al., 2021). Dragon fruit can thus be an alternative to raise hemoglobin levels in pregnant women without side effects. Fluctuations in hemoglobin levels after consuming dragon fruit juice are also influenced by nutrition, physical activity, and rest patterns. Differences in hemoglobin level increases before and after consuming dragon fruit result from insufficient nutritional intake, increased nutrient loss, and the heightened nutritional needs of the mother during pregnancy (Astriana et al., 2023).

Dragon fruit processed into jelly or juice is effective in increasing hemoglobin levels in anemic pregnant women. Processing dragon fruit into jelly or juice facilitates absorption, as it is absorbed faster. Consuming fruits in juice or pureed form allows the digestive system to absorb them in about 20 minutes, while directly consuming whole fruit takes approximately 18 hours for full absorption (Sari et al., 2021).

Erythrocyte formation, or erythropoiesis, involves 3-5 or 2.5-4 grams of Fe in the body, with 30-40% stored iron. Fe distribution is 70% (2-2.5 g) in Hb, and 26% stored in the liver, spleen, and bones. In food, iron exists as organic compounds, primarily in ferrous and ferric sulfate forms, with ferrous being more easily absorbed. In the body, Fe binds with protein in either ferrous or ferric forms. The active form is generally ferrous. Iron is found in two forms: heme and non-heme. Red meat contains about 40% heme iron and 60% non-heme iron, predominantly from hemoglobin and myoglobin in meat, poultry, and fish. Only 5-10% of dietary iron is absorbed, and it is 2-3 times easier to absorb, relatively unaffected by other dietary factors. Most dietary iron is non-heme, found in vegetables and fruits, with 25-35% of heme iron absorbed, while non-heme iron absorption is about 3% lower than heme iron, which is significant. Heme iron is only found in animal meat, so vegetarians need to be cautious of the low absorption rate of non-heme iron (Chendriany et al., 2021).

CONCLUSION

Based on the results of the study and discussion, it can be concluded as follows: Fruits or vegetables as sources of non-heme iron used are beetroot, red dragon fruit, moringa leaves, red spinach and green spinach combined with lemon and honey with different doses between 15 grams to 200 grams of food weight accompanied by continuing to consume Fe tablets. The average duration of administration ranges from 5 days to 56 days (8 weeks). The results of statistical tests on the effect of administering fruit or vegetable juice as sources of non-heme iron on hemoglobin levels of pregnant women with anemia before and after treatment with a p-value of 0.000 to 0.719. Based on the results of the review that has been conducted, pregnant women can consume fruit or vegetable juice as sources of non-heme iron while continuing to consume Fe tablets regularly during pregnancy as an alternative to help increase iron supplies and prevent iron deficiency which can cause pregnancy anemia.

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