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by Tri Restu Handayani

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Differences in the Effectiveness of Papaya and Guava on Hemoglobin Levels of Pregnant Women at the Nagaswidak Health Center

Tri Restu Handayani[1], Devina Anggrainy Dencik[2]
Bina Husada Palembang College of Health Sciences, Indonesia

Jl. Syech Abdul Somad No 22 Subdistrict 26 Ilir Palembang City, Indonesia
Corresponding author: restu_senja@ymail.com

Abstract. World Health Organization (WHO) 41% of pregnant women worldwide experience anemia. Overall, the prevalence of anemia in pregnant women in developed countries is 49% and in developing countries it is 53%. In Indonesia, the rate of anemia in pregnant women is quite high, namely 48.9%. Anemia that is commonly experienced by pregnant women is iron deficiency anemia. Iron is needed in hemopoesis (blood formation), namely in the synthesis of hemoglobin. Iron absorption can be increased by consuming ± 25 mg of vitamin C sources in food. The aim of the research was to determine the difference in the effectiveness of papaya and red guava on hemoglobin levels in pregnant women with anemia. The research was conducted at the Nagaswidak Community Health Center in June 2024 using a quasi-experimental two group pretest and posttest. The population in this study were all pregnant women who were in the working area of the Nagaswidak Palembang Community Health Center in May 2024 with Hb levels of 9 – 10.9 gr/dl. The sampling technique used purposive sampling totaling 30 respondents. The results of the Wilcoxon test research showed that the effect of papaya (p value 0.000) and guava (p value 0.000) was obtained. The results of the Mann Whitney union obtained a p value of 0.116. There is an effect of papaya on hemoglobin levels in pregnant women, there is an effect of guava on hemoglobin levels. There is no difference in the effect of papaya and guava on hemoglobin levels in pregnant women at the Nagaswidak Community Health Center. It is hoped that health workers will increase education regarding the prevention of anemia in pregnant women, one of which is by consuming vitamin C in fruit.

Keywords : Anemia, vitamin C, guava, papaya

1. BACKGROUND

Pregnancy is a natural process starting from fertilization, nidation (implantation), then the fetus develops until it reaches term age. During pregnancy, changes occur in the body's systems caused by increased hormones, one of which is changes in the cardiovascular system (Handayani and Sartika, 2021).

Changes in the cardiovascular system during pregnancy cause hemodilution (blood thinning) as a result of the volume of blood plasma increasing higher than the number of red blood cells. Hemodilution causes the hemoglobin level of pregnant women to decrease to <11 gr/dl. This condition is called pregnancy anemia (Handayani and Sartika, 2021).

Anemia is a common problem or complaint in pregnancy. *According to the World Health Organization* (WHO), 41% of pregnant women worldwide experience anemia. Overall, the prevalence of anemia in pregnant women in developed countries is 49% and in developing countries it is 53%. In Indonesia, the rate of anemia in pregnant women is quite high, namely 48.9% (Ministry of Health, 2019).

Based on the results of Basic Health Research (Riskesdas) in 2018, the percentage of pregnant women experiencing anemia in Indonesia increased compared to the results of

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Riskesdas in 2013, namely 48.9%. Anemia is most common at ages 15-24 years, namely 84.6%, ages 25-34 years 2 at 33.7%, ages 35-44 years at 33.6%, and ages 45-54 years at 24% (Riskesdas , 2018). Based on data from the South Sumatra Province Central Statistics Agency, the number of pregnant women with anemia in 2020 was 11.8%, in 2021 it was 6.2% and in 2022 it was 4.17%. Anemia in pregnant women can have an impact on the nutrition of the fetus. Anemia can increase the risk of premature birth, abortion, LBW, IUD, molhydatid and bleeding events before and after delivery. During the postpartum period there is a risk of uterine involution disorders (Kusuma et al, 2021).

The government and related parties have implemented a program to provide Blood Supplement Tablets (TTD) as an effort to prevent and treat anemia in pregnant women. However, this program has not been 100 percent successful. One factor in the failure of this program is problems related to iron absorption. Not many pregnant women know about how to maximize iron absorption in the body (Darmawati, 2019). Iron is needed in hemopoesis (blood formation), namely in the synthesis of hemoglobin. Iron absorption can be increased by consuming ± 25 mg of vitamin C sources in food (Hardiansyah, 2017).

Papaya is a fruit that is very rich in fruit sugar, fiber, various vitamins (especially vitamins C and A), minerals, beta carotene (carotene) and enzymes (papain). Not only the fruit, papaya leaves also contain vitamin C. Vitamin C functions in the formation of connective tissue or 3 intercellular materials, the formation of red blood cells, helps cell development and wound healing, and protects against fever (Muchtar, 2015).

The results of Mardiana's research (2020) show that the average hemoglobin level in pregnant women with anemia before consuming papaya was 9.7 mg/dl, including mild anemia, whereas after consuming papaya the average hemoglobin level was 11.2 mg/dl including in the non-anemic category. The results of the t test obtained a p *value* of 0.000, meaning that consumption of papaya has an influence on the hemoglobin levels of pregnant women.

Apart from papaya, red guava has a high vitamin C content which helps the absorption of Fe in blood-boosting tablets. The statistical test results of research by Fandy et al (2023) show that the p-value = 0.000 (P < 0.05), which means that red guava juice can increase the hemoglobin levels of pregnant women in the third trimester at the Tunas Harapan Community Health Center in 2022.

Based on the background above, researchers are interested in conducting research with the title "Differences in the Effectiveness of Guava and Papaya on Hemoglobin Levels of Pregnant Women at the Nagaswidak Community Health Center"

2. THEORETICAL STUDY

Hemodilution is a hemodynamic change where there is an increase in blood volume but the number of erythrocytes decreases so that the blood becomes thin. This blood thinning is a physiological compensation for pregnant women which results in low hemoglobin or what is called anemia (Handayani and Tri, 2021).

Anemia is practically defined as a hemoglobin concentration below the normal limit. Pregnant women experience hemodilution as a form of physiological adaptation to meet the needs of the mother and fetus. The peak of hemodilution in pregnant women occurs at 24 weeks of gestation, but can continue until 37 weeks of gestation. Generally, pregnant women are considered anemic if their hemoglobin level is below 11 g/dl (Prawirohardjo, 2019)

The main cause of anemia in pregnant women is a lack of intake of food sources of Fe and increased Fe requirements due to physiological changes (Sulistyowati, 2015) . Adequate Fe intake is not only met by consuming food sources of Fe but is influenced by variations in Fe absorption. This variation is caused by physiological changes in the body of pregnant women, thereby increasing the body's need for Fe, the types of food sources of Fe consumed, and dietary factors that accelerate and inhibit Fe absorption (Fauziyah et al, 2020).

Fe needs increase during pregnancy to meet Fe needs due to increased blood volume, to provide Fe for the fetus and placenta, and to replace blood during delivery (Putra, 2015). Large blood loss in pregnant women occurs during and after giving birth. The side effects due to blood loss depend on the amount of blood lost and Fe reserves in the body. Pregnancy complications that lead to bleeding during and after delivery are also associated with an increased risk of anemia (Fandy et al, 2023).

Anemia causes low physical abilities because the body's cells do not receive enough oxygen supply. Besides that, antepartum and postpartum bleeding are more often found in anemic women (Asbar, 2021) and are more often fatal because anemic women cannot tolerate blood loss (Fikawati, 2017). The impact of anemia on pregnancy varies from very mild complaints to continued abortion, immature/premature parturition (Farhan, 2021), disruption of the labor process (bleeding), postpartum disorders (low resistance to infection and stress, low breast milk production), and fetal disorders (abortion, dysmaturity, microsomy, congenital defects, LBW, perinatal death, etc.) (Adriani et al, 2016).

The Ministry of Health has implemented various activities and programs with the main aim of reducing the rate of anemia among pregnant women in Indonesia (Fauziyah, 2020). Programs that have been carried out by the Government include the development of Communication, Information and Education (KIE) strategies, namely activities aimed at increasing knowledge and attitudes of pregnant women about anemia and compliance with taking blood supplement tablets through counseling carried out by health workers, material fortification programs food with iron for pregnant women which aims to increase Hb levels in pregnant women, and a program to provide blood supplementation tablets or iron tablet supplementation (Ministry of Health of the Republic of Indonesia, 2019).

Papaya (*Carica papaya L.)* is a type of tropical fruit whose fruit is sweet and has reddish yellow flesh. Papaya fruit contains many vitamins, especially vitamin A, vitamin B9, vitamin C and vitamin E. Apart from vitamins, papaya also contains minerals such as phosphorus, magnesium, iron and calcium (Kurnia, 2018).

Guava fruit (Psidium guajavaL.) is a type of fruit that is quite trusted by the public for increasing hemoglobin levels. Apart from being more affordable, it turns out that red guava fruit also has a nutritional composition. However, you need to know that guava fruit has different colored flesh, some have white flesh and some have red flesh (Fandy et al., 2023).

Guavas differ in terms of their nutritional value as well, but it turns out that guavas with red flesh have a more comprehensive nutritional profile and contain more vitamin C. The amount of vitamin C in guava is similar to six times that of oranges, ten times that of papaya, seven twelve times as much as guava, and thirty times as much as banana. Apart from being useful in preventing anemia, vitamin C also has a function as an antioxidant in maintaining and improving the health of capillaries, preventing canker sores and bleeding gums (Hadi, 2023).

Table 1
Nutritional Content Per 100 grams of Papaya

No	Element	Heavy
1	Vitamin C	60 – 120 milligrams
2	Vitamin A	18.7-74.0 micrograms
3	Beta carotene	276 micrograms
4	Substance iron	0.1 milligrams
5	Calcium	20 milligrams
6	Potassium	182 milligrams

Source: Ministry of Agriculture of the Republic of Indonesia (2021)

Table 2
Nutritional Content Per 100 grams of Red Guava

No	Element	Heavy
1	Vitamin C	228.3 milligrams
2	Vitamin A	31 micrograms
3	Phosphor	28 milligrams
4	Substance iron	0.26 milligrams
5	Calcium	14 milligrams
6	Carbohydrate	12.2 grams

Source: Ministry of Agriculture of the Republic of Indonesia (2021)

3. RESEARCH METHODS

The method used in this research was *a quasi-experimental two group pretest and posttest*. The first group was the group given red guava, the second group was the group given papaya. The intervention was given for 7 days where each group consumed 100 grams of red guava per day and the group consumed 200 grams of papaya per day. Data analysis used the *Wilcoxon test* and *Mann Whitney Test*. The population in this study were all pregnant women who were in the working area of the Nagaswidak Palembang Community Health Center in May 2024 with Hb levels of 9 – 10.9 gr/dl. The sampling technique used *purposive sampling* totaling 30 respondents with the following inclusion and exclusion criteria:

Inclusion criteria:

1. Third trimester pregnant women with hemoglobin levels of 9 – 10.9 gr/dl
2. Willing to be a respondent
3. Have no disease or history of blood disorders
4. Regularly consume Fe tablets
5. Not actively consuming tea and/or coffee

Exclusion criteria:

1. Cough (papaya group)
2. Hypoglycemia (guava group)
3. Suffering from severe anemia
4. Did not complete the 7 day intervention

4. RESULTS AND DISCUSSION

The results of univariate analysis of respondent characteristics can be seen in table 3.

Table 3
Frequency Distribution and Percentage of Respondent Characteristics

Characteristics	f	%
Age		
- < 20 years	6	20
- 20-35 years	18	60
- > 35 years	6	20
Education		
- < High school	21	70
- ≥ high school	9	30
Parity		
- 0-3 children	22	73
- > 3 children	8	37
Work		
- Work	9	30
- Doesn't work	21	70
Hemoglobin levels		
- 9-9.9 gr/dl	12	40
- 10-10.9 gr/dl	18	60

Table 3 explains that the majority of respondents aged 20-35 years (60%), education ≥ high school (70%), have 0-3 children (73%), do not work (70%) and have hemoglobin levels of 10-10.9 gr/ dl (60%).

Table 4
Effect of Papaya on Hemoglobin Levels in Pregnant Women at Nagaswidak Health Center

Hemoglobin levels	Mean	Mean Difference	elementary school	*p value*
Pretest	9.35	1.10	0.714	0,000
Posttest	10.45		0.526	

Table 5
Effect of Red Guava on Hemoglobin Levels in Pregnant Women at the Nagaswidak Health Center

Hemoglobin levels	Mean	Mean Difference	elementary school	*p value*
Pretest	9.20	1.30	0.704	0,000
Posttest	10.50		0.510	

Table 6
Differences in the Effectiveness of Guava and Papaya on Hemoglobin levels of pregnant women at the Nagaswidak Community Health Center

Group	Mean	Mean Difference	elementary school	*p value*
Pawpaw	10.45	0.5	0.526	0.116
Guava	10.50		0.510	

Table 4 and table 5 explain the results of the Wilcoxon test for each group, where the p value obtained in the group given papaya was 0.000, which means that statistically papaya has an influence on hemoglobin levels in pregnant women. According to the Indonesian Ministry of Agriculture (2021), every 100 grams of papaya contains 60 – 120 milligrams and 0.1 milligrams of iron. Vitamin C is an element that the body needs to help speed up the absorption of iron. The results of this research are supported by research by Mardiana (2020) which shows that the t test results obtained a p *value* of 0.000, meaning that consumption of papaya fruit has an influence on the hemoglobin levels of pregnant women. Mutiara's research (2023) shows the same results. The results of the study showed that there was a significant effect on the average value before and after being given papaya fruit to increase hemoglobin levels in second trimester anemic pregnant women at the Pancoran Community Health Center.

Papaya is a fruit that is very rich in fruit sugar, fiber, various vitamins (especially vitamins C and A), minerals, beta carotene (carotene) and enzymes (papain). Not only the fruit, papaya leaves also contain vitamin C. Vitamin C functions in the formation of connective tissue or 3 intercellular materials, the formation of red blood cells, helps cell development and wound healing, and protects against fever (Muchtar, 2015).

The results of the Wilcoxon test in the group given red guava obtained a p value of 0.000, which means that there is an effect of red guava on hemoglobin levels in pregnant women. According to the Indonesian Ministry of Agriculture (2021), every 100 grams of papaya

contains 228.3 milligrams and 0.26 milligrams of iron. Along with papaya, guava is also a fruit that is high in vitamin C, so the body needs it to speed up the process of absorbing iron.

The results of this research are supported by research by Fandy et al (2023) which shows that the p-value = 0.000 (P < 0.05) which means that red guava juice can increase the hemoglobin levels of pregnant women in the third trimester at the Tunas Harapan Community Health Center in 2022. Hadi's research (2023) is also in line with the results of this study which show that there is an effect of giving guava fruit on hemoglobin levels.

Based on the results of the Mann Whitney test, a p value of 0.116 was obtained, which means that there is no difference in effectiveness between papaya and red guava on hemoglobin levels in pregnant women. These two fruits have been proven to have an effect on increasing hemoglobin levels. There is a difference in the average value of hemoglobin levels of 0.5 which is not statistically significant.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the research results, it can be concluded that the vitamin C content in papaya and red guava fruit has been proven to significantly increase hemoglobin levels in pregnant women because vitamin C is an important element in the absorption of iron in the body. It is recommended that health workers continue to increase education about preventing anemia in pregnant women, one of which is by consuming papaya and guava fruit.

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