ISSN 2354-8428
e-ISSN 2598-8727

JURNAL KEPERAWATAN KOMPREHENSIF

COMPREHENSIVE NURSING JOURNAL

Sekolah Tinggi Ilmu Keperawatan PPNI Jawa Barat

Vol. 8 Special Edition, June 2022

JURNAL KEPERAWATAN KOMPREHENSIF	VOL. 8	Special Edition	Page 1-222	Bandung June 2022	ISSN 2354-8428 e-ISSN 2598-8727

p-ISSN : 2354 8428 | e-ISSN: 2598 8727

Jurnal Keperawatan Komprehensif
Vol. 8 Special Edition Juni 2022

Research Article

The Effectiveness of Consumption of Red Guava Juice Against Increasing Hemoglobin Levels in Pregnant Women

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Received : 26/05/2022
Revised : 22/06/2022
Accepted : 28/06/2022
Online : 30/06/2022
Published : 30/06/2022

Abstract

Aims: To evaluate the effectiveness of consuming red guava juice on increasing hemoglobin levels in pregnant women.
Methods: Using a quasi-experimental design with a pre- and post-test and a control group. In this study, 38 pregnant women who had anemia between January and March 2022 constituted the sample, and the sampling strategy employed was a random sampling.
Results: The average HB level in the intervention group pretest was 10.24gr%, and the post-test was 12.49gr%. In the control group, the pretest was 10.32gr%, and the post-test was 10.96gr%. Haemoglobin levels in pregnant women can be increased by drinking red guava juice, with a p-value of 0.0001.
Conclusion: Hemoglobin levels in pregnant women can be raised by drinking red guava juice. It is expected that midwives provide input in efforts to improve health services to pregnant women to advise pregnant women to consume red guava juice to prevent anemia.

Keywords :
HB Level, Red Guava Juice

INTRODUCTION

Pregnancy-related anemia is a leading cause of maternal mortality, especially in low-income countries. *The World Health Organization* (WHO) 2019 reported that anemia in pregnant women in developing countries was 45% higher than in developed countries, 13%. The prevalence of pregnancy anemia in developed countries such as America is around 17%, and Turkey is 28%, while in developing countries such as countries in Asia, namely Laos, 57.1%, Filipina 56.2%, India at 54% and the highest prevalence in the African region of 60% (1).

Anemia during pregnancy is fairly common in Indonesia, a developing country. The 2018 Basic Health Research (Riskesdas) report found that 48.9 percent of pregnant women in Indonesia suffered from anemia. That percentage is up from 2013 when it was 37.1%. Women between the ages of 15 and 24 had the highest prevalence of anemia during pregnancy (84.6%). The high rate of pregnancy-related anemia in Indonesia can be traced back to social factors such as poverty, inadequate food

https://doi.org/10.33755/jkk

p-ISSN : 2354 8428 | e-ISSN: 2598 8727

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availability, discrimination based on gender, and a lack of education about healthy eating habits. Pregnant women in Central Java have a higher rate of anemia than any other region in Indonesia (78.9%). This percentage is far larger than the national average of 71.2% (2).

Pregnancy-related anemia had a prevalence of 35.2% in 2019, according to profile data from the Banten Provincial Health Office, and was expected to rise to 37.7% in 2020 (Banten Provincial Health Office, 2020). The percentage of pregnant women with anemia in Pandeglang Regency for the last 5 years has fluctuated, namely in 2016 (47.15%), 2017 (35.92%), 2018 (34.20%), 2019 (37.90%) and 2020 (41.23%) (Dinkes Kabupaten Pandeglang, 2020).

Anemia during pregnancy occurs frequently in Indonesia due to iron deficiency of up to 62,3%. It has an effect that can be fatal if not overcome immediately. It can cause miscarriage, premature delivery, uterine inertia, old delivery, uterine atony, bleeding and shock, and even death for the mother and fetus (3). Pregnancy anemia often occurs in the third trimester. The average prevalence of anemia in the third trimester was more than 30%. 4.5% of pregnant women suffered from anemia in the first trimester, 4.5% in the second trimester, 44.1%, and in the third trimester, 45.7%. In the third trimester, there is hemodilution and a decrease in hemoglobin levels that begin from 6-8 weeks of gestation and reach a peak at 32-34 weeks of gestation (4)

The government's policy in dealing with pregnancy anemia is to give iron (Fe) and folic acid tablets. Pregnant women are recommended to take 60 mg of iron and 0.25 folic acid or 200 mg of ferrosulfate during pregnancy of at least 90 tablets. The administration of tablets begins in the first trimester of pregnancy. However, not a few pregnant women who consume Fe tablets experience several side effects such as nausea, vomiting, constipation, and heartburn (5).

Efforts to increase the hemoglobin levels of pregnant women and give Fe tablets can also be combined with complementary therapies derived from herbs, Consuming red guava juice is one such method. In terms of vitamin C concentration, guava fruit is unparalleled. Ascorbic acid levels in guava are roughly 87 milligrams per 100 grams, making it significantly higher than those in oranges. Guava has 49 calories, 0.9 grams of protein, 0.3 grams of fat, 12.2 grams of carbs, 14 milligrams of calcium, 28 milligrams of phosphorus, 1.1 milligrams of iron, 25 international units of vitamin A, 0.05 milligrams of vitamin B1, and 86 grams of water per 100 grams. Furthermore, vitamin C contained in guava increases iron absorption by the body. Therefore, the body is expected to absorb iron optimally and increase hemoglobin levels (6).

Research (7) Hemoglobin levels in Taiwan increased from an average of 8.8 g/dl before the administration of red guava juice to an average of 12.6 g/dl after consumption of red guava juice. Research by (8) showed results that the consumption of red guava juice is more effective in increasing the erythrocyte index and can be a complement to prevent the occurrence of anemia. Research by (9) in Bandung Subdistrict, Ngrampal District, Sragen Regency showed results that hemoglobin levels in third-trimester pregnant women increased with the consumption of red guava juice in combination with Fe tablets, with an average increase in hemoglobin levels from pre- to post-test of 11.06 and 11.29 grams per deciliter, respectively, in the group given Fe tablets alone, and of 10.23 and 11.6 grams per deciliter, respectively, in the group given Fe tablets + red guava juice.

Based on medical record data from the Saketi Health Center, Pandeglang Regency, the number of pregnant women with anemia in the last three years increased, namely in 2018, as many as 278 people (61.5%) from 452 pregnant women. In 2019, as many as 283 people (63.02%)

https://doi.org/10.33755/jkk

p-ISSN : 2354 8428 | e-ISSN: 2598 8727

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from 449 pregnant women, and in 2020, as many as 289 (64.22%) from 450 pregnant women.

In a preliminary study conducted at the Saketi Health Center in November 2021, by conducting interviews with ten pregnant women, 7 of them had anemia. From the direct interviews with mothers who had anemia, 4 mothers stated that they regularly took Fe tablets but rarely consumed nutritious food, fruits, and vegetables due to the mother's lack of economic conditions. In comparison, the other 3 mothers stated that they did not regularly drink Fe tablets because they often forget. During pregnancy, mothers rarely consume fruits that contain vitamin C, including consuming guava both in the form of juice and eating the fruit directly and not knowing the properties of guava fruit. Researchers are interested in studying the effects of drinking red guava juice on pregnant women's hemoglobin levels at the Saketi Pandeglang Health Center in 2022 based on the information provided above.

METHODS

Pretest design as a quasi-experiment Design of a post-test with a control group. Primary data, in this context, refers to information gleaned directly from the outcomes of observations and is used in the course of data gathering. A pregnancy observation sheet is the instrument of choice. As many as 38 pregnant women with anemia were included in this study, which took place between January and March 2022 at the Saketi Pandeglang Health Center (total sample). Univariate and bivariate analysis using a paired sample t-test both make use of the analysis technique.

RESULTS

Tabel 1.
Average HB Levels of Pregnant Women in the Intervention Group and Control Group Before and After Consumption of Red Guava Juice at Saketi Health Center Pandeglang in 2022

Variable	Group Type	Mean		Std. Deviation		Min – Maks	
		Pre-test	*Post-test*	*Pre-test*	*Post-test*	*Pre test*	*Post test*
levels HB	Intervention	10,24	12,49	0,434	0,490	9,4 - 10,9	11,5 - 13,2
	Control	10,32	10,96	0,443	0,445	9,4 - 10,9	10,2 - 11,8

Based on the table above, it was found that in the intervention group, before the consumption of red guava juice, the average HB level was 10.24. After consuming red guava juice, the average HB level was 12.49. In the control group that did not consume red guava juice, the average HB content was 10.32, and after that was 10.96. The standard deviation value in the pre-test intervention group was 0.434, and the post-test was 0.490, while in the pre-test control group, it was 0.443, and the post-test was 0.445. HB levels were at least in the pre-test intervention group 9.4 – 10.9 and post-test 11.5 – 13.2, while in the control group, the minimum pre-test value was 9.4 – 10.9 and post-test 10.2 – 11.8.

https://doi.org/10.33755/jkk

p-ISSN : 2354 8428 | e-ISSN: 2598 8727

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Table 2.
Effectiveness of Consumption of Red Guava Juice Against Increased Hemoglobin Levels in Pregnant Women at the Saketi Health Center, Pandeglang Year Regency 2022

Variable	Group Type	Mean		Std. Deviation		Mean Difference	Difference SD	*P-value*
		Pre-test	*Post-test*	*Pre-test*	*Post-test*			
Levels HB	Intervention	10,24	12,49	0,434	0,490	2,25	0,056	0,000
	Control	10,32	10,96	0,443	0,445	0,64	0,002	0,000

The findings of a paired sample t-test comparing HB levels before and after drinking red guava juice for one month show a statistically significant decrease (p 0.05) in HB levels. These findings suggest that pregnant women's HB levels vary both before and after drinking red guava juice. Juice consumption during pregnancy is associated with elevated HB levels, as shown by the mean difference column. In contrast, the HB levels of pregnant women who don't drink red guava juice tend to rise. The foregoing suggests that red guava juice drinking may be useful in preventing the elevation of HB levels.

DISCUSSION

Average HB Levels of Pregnant Women in the Intervention Group and Control Group Before and After Consumption of Red Guava Juice

The study found that the average HB level in the intervention group was 10.24 before they started drinking the red guava juice. On average, people's HB levels increased to 12.49 after drinking red guava juice. In the control group that did not consume red guava juice, the average HB content was 10.32, and after that was 10.96. The standard deviation value in the pre-test intervention group was 0.434, and the post-test was 0.490, while in the pre-test control group, it was 0.443, and the post-test was 0.445. HB levels were at least in the pre-test intervention group 9.4 – 10.9 and post-test 11.5 – 13.2, while in the control group, the minimum pre-test value was 9.4 – 10.9 and post-test 10.2 – 11.8.

Hemoglobin is an iron-containing molecule capable of transporting oxygen and is found in red blood cells. Gram Hb per deciliter of blood is an index that expresses the capacity of blood to transport oxygen. Measurement of Hb in the blood is the most widely used method as an anemia screening test (10). Increased hemoglobin levels in pregnant women with anemia are by consuming tablets to add blood or iron. The iron needs of pregnant women are increasing so that an additional 700-800 mg is needed, including 500 mg to increase hemoptysis, 300 mg for the fetal needs for the hematopoiesis process while in the womb, 200 mg for reserve loss due to postpartum hemorrhage, or an additional iron of about 30-60 mg per day is needed.

The results of this study are in line with the results of (11), who said that there were differences in the average value of *pre-test* and *post-test* hemoglobin levels in the control group and intervention group, wherein the control group, the pre-test value was 9.98. The post-test was 10.56, while in the intervention group, the pre-test value was 10.16, and the post-test was 11.01.

According to the results of the study, there is a significant average difference between

p-ISSN : 2354 8428 | e-ISSN: 2598 8727

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the control group and the intervention group, with a larger difference in the average HB level in the intervention group compared to the control group. This is because pregnant women in the intervention group are also given red guava juice, which is rich in vitamin C and can increase platelets, in addition to Fe tablets. Meanwhile, pregnant women were only given Fe tablets in the control group, so the difference was seen between pregnant women who consumed red guava juice and those who did not. The benefits of red guava include containing vitamin c, maintaining the immune system, being rich in folic acid, and preventing anemia. Therefore, consuming red guava for pregnant women will help prevent anemia. Even if iron deficiency during pregnancy can be risky for the mother and fetus, for pregnant women affected by anemia, there can be bleeding during pregnancy or childbirth, weakness, and fatigue easily, which interferes with daily activities. Moreover, in the fetus, it can cause BBLR (low birth weight) due to disruption of the fulfillment of nutrients while in the womb, *premature* birth, and abortion.

Effectiveness of Consumption of Red Guava Juice against Increasing Hemoglobin Levels in Pregnant Women

From the study results, it can be known that the test for changes in HB levels with the consumption of red guava juice for 1 month using *a paired sample t-test* obtained results that had a significant value of 0.000 (< 0.05). These findings suggest that pregnant women's HB levels vary both before and after drinking red guava juice. An rise in HB levels is seen in the mean difference column among pregnant women who eat juice. Meanwhile, pregnant women who do not consume red guava juice show an increase in HB levels, indicating an increase in HB levels. From the data above, it can be concluded that there is effectiveness in consuming red guava juice against increasing HB levels.

Red guava juice rich in iron can help the iron absorption process and can treat anemia in pregnant women. Foods with iron content might be better absorbed with the help of vitamin C. Vitamin C aids iron absorption by converting ferrous iron (Fe3 +) to ferrous (Fe2 +) in the small intestine. If the stomach's pH is lowered, then more decrease will occur. Vitamin C's ability to raise stomach pH can boost iron absorption by as much as 30 percent. Furthermore, vitamin C aids in the transport of iron from plasma transferrin to liver ferritin. Most transferrin in the blood is responsible for transporting iron to the bone marrow, where it is stored for use by the body. (11).

The results of this study are in line with the research of (12), with an average increase in hemoglobin levels between pre- and post-test of 11.06 g/dL and 11.29 g/dL, respectively, in the group that was only given Fe tablets, it has been claimed that the consumption of red guava juice in conjunction with Fe tablets has an effect on increasing hemoglobin levels in pregnant women in the third trimester. Fe pills and red guava juice with respective percentages of 10.23 and 11.6 were administered to the study participants.

The results of this study were also supported by the results of (13), whoever said that pregnant women's Hb levels might be raised by administering a mixture of red guava juice and Fe was correct; the treatment group saw an average increase of 1.04 g/dl, while the control group saw an increase of only 0.5 g/dl.

According to the researcher's assumption, from the results obtained that there is a difference between the control group and the intervention group, Those who hypothesized that giving pregnant women a combination of red guava juice and Fe may increase their Hb levels were on the money; the treatment group observed an average increase of 1.04 g/dl, while the control group reported an increase of only 0.5 g/dl. However, the results obtained from the treatment showed that mothers who

https://doi.org/10.33755/jkk

p-ISSN : 2354 8428 | e-ISSN: 2598 8727

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consumed red guava experienced a significant increase in Hb levels, which was seen from the average value.

Consumption of red guava by pregnant women is associated with an increase in blood levels of several vitamins and minerals, including vitamins A, B1, and C, as well as the amino acids tryptophan and lysine. Women who are pregnant may notice an increase in their hemoglobin levels after eating red guava. It's possible that this is the result of a synergistic effect between the Fe tablets and the red guava juice, which can raise Hb levels more than either treatment alone.

Hemoglobin levels increased in both groups, but the increase in the intervention group was statistically significant, besides being given iron supplements (Fe tablets), they were also given red guava juice which contains a lot of vitamin C and iron and phosphorus. So it can be said that although there is a difference in value, the two interventions can both increase hemoglobin levels.

However, the administration of Fe tablets accompanied by red bean juice is more effective in increasing hemoglobin levels than Fe tablets alone. The combination of Fe tablets and red guava juice has been shown to increase Hb levels more than a single treatment alone. Hemoglobin levels increased more in the intervention group than the control group because the intervention group also received red guava juice, which is rich in vitamin C, iron, and phosphorus, in addition to the iron supplements (Fe tablets). So it can be concluded that although there are differences in average values, the two interventions can increase hemoglobin levels. However, the administration of Fe tablets accompanied by red guava juice is more effective in increasing hemoglobin levels than only being given Fe tablets.

CONCLUSION

Average HB levels in the pretest intervention group were 10.24gr% and post-test 12.49gr%. There was a control group of pretest 10.32gr% and posttest 10.96gr%. At the Saketi Pandeglang Health Center in 2022, there is a p-value of 0.000 for the efficacy of consuming red guava juice against an increase in hemoglobin p levels in pregnant women.

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https://doi.org/10.33755/jkk

p-ISSN : 2354 8428 | e-ISSN: 2598 8727

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