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The effect of red guava juice supplementation combined with iron tablets on hemoglobin levels among premarital women

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Abstract

Background: Anemia among women of reproductive age remains a public health concern. In 2024, Ambarawa Health Center, Pringsewu District, reported 24 cases of anemia among unmarried women. Red guava juice contains vitamin C, which may support non-heme iron absorption.

Purpose: To determine the effect of red guava juice combined with iron tablets on hemoglobin levels in premarital women.

Method: This quantitative study used a two-group pretest–posttest quasi-experimental design. Of 30 premarital women identified in the study area, 20 with anemia were included through total sampling and assigned to an intervention group ($n = 10$), receiving red guava juice and iron tablets, or a control group ($n = 10$), receiving iron tablets alone. Hemoglobin levels were measured before and after the intervention.

Results: Mean hemoglobin levels increased from 10.95 ± 0.58 to 11.64 ± 0.66 g/dL in the intervention group and from 10.89 ± 0.40 to 11.18 ± 0.41 g/dL in the control group. The mean increases were 0.69 and 0.29 g/dL, respectively, yielding a descriptive between-group difference in change of 0.40 g/dL. A between-group significance test and confidence interval were not available in the supplied data.

Conclusion: Hemoglobin levels increased in both groups, with a greater descriptive increase in the group receiving red guava juice and iron tablets. The additional effect of red guava juice cannot be confirmed statistically without a verified between-group analysis.

Suggestion: Premarital women should adhere to iron supplementation and consume vitamin C-rich foods as part of a balanced diet.

Keywords: Hb Level; Guava Juice; Premarital Women.

INTRODUCTION

Anemia is a condition characterized by hemoglobin (Hb) and erythrocyte levels below normal. Hemoglobin functions as an oxygen-carrying protein in red blood cells (Proverawati, 2019). Iron (Fe)-deficiency anemia is a leading cause of anemia and commonly affects adolescent girls and pregnant women, generally due to nutritional deficiencies, particularly iron deficiency (World Health Organization, 2025; Proverawati, 2019). Globally, the prevalence of anemia among women of reproductive age (WRA) reached 29.6% in 2018 and increased to 30% in 2019. Indonesia ranked fourth in Southeast Asia, with a prevalence of 30.4% (World Health Organization, 2023).

Nationally, the prevalence of anemia increased from 37.1% in 2013 to 48.9% in 2018, with a prevalence of 39.5% among individuals aged 15-24 years (Ministry of Health of the Republic of Indonesia, 2018). In Lampung Province, in 2023, among 69,988 premarital women, 2,002 experienced anemia (5.2%), with the highest prevalence in Central Lampung (31.5%) and the lowest in Way Kanan (0.2%). In Pringsewu Regency, there were 2,019 premarital women, with 53 anemia cases reported across several community health centers (Lampung Provincial Health Office, 2024). In 2024, cases increased; for example, the number of cases at Ambarawa Community Health Center rose from 5 to

24. Anemia among premarital women increases the risk of pregnancy complications, including maternal death, low birth weight (LBW), infection, miscarriage, and preterm birth (Utami & Puspita, 2021; Merita, 2024). In 2023, data from Pringsewu Regency indicated that 909 neonates experienced complications out of 6,063 live births (Pringsewu Regency Health Office, 2024).

Preventive measures include nutritional education and iron supplementation; however, adherence to iron tablet consumption remains low. An alternative intervention is the consumption of red guava juice, which is rich in vitamin C and may enhance the absorption of non-heme iron. Previous studies have shown that combining red guava juice with iron tablets is more effective in increasing hemoglobin levels than iron tablets alone (Sari & Listiarni, 2021; Anggraeni, 2023; Yuliva et al., 2023). Government policy recommends the consumption of 60 mg of iron and 400 mcg of folic acid (Ministry of Health of the Republic of Indonesia, 2018), alongside iron-rich food sources such as spinach, chicken liver, and guava (Bakta, 2019; Hartati, 2021; Yantina et al., 2023). Guava contains approximately twice as much vitamin C as oranges. Vitamin C acts as an antioxidant, enhances iron absorption, and may support increases in hemoglobin levels (Herlina, 2019; Delfina et al., 2023; Rishel, 2023).

Research indicates that vitamin C obtained from 100 grams of red guava can increase iron absorption by up to two- to threefold (Nufus et al., 2023). The combination of iron tablets and red guava juice consumed over seven days has also been reported to increase hemoglobin levels more rapidly (Winarni et al., 2020; Khairussyifa et al., 2020; Supriyatin & Idealistiana, 2024; Cansian et al., 2024).

RESEARCH METHOD

This study used a quantitative quasi-experimental design with two groups and pretest–posttest measurements. The study was conducted in the working area of Ambarawa Community Health Center, Pringsewu Regency, Lampung, Indonesia, from April to June 2025.

The study population consisted of premarital women in the study area. The Methods section of the original manuscript reports that 30 premarital women were identified in March, of whom 20 had anemia. A total of 20 eligible participants were included using a

total sampling approach and divided into an intervention group ($n = 10$) and a control group ($n = 10$).

Participants were eligible if they were women aged 20–30 years, had hemoglobin levels below 12 g/dL, agreed to participate, did not take iron supplements outside the study program, and had no chronic disease. Exclusion criteria included severe adverse effects during the intervention, non-adherence to the intervention, use of additional supplements, newly diagnosed medical conditions, and incomplete hemoglobin measurements.

The intervention group received 350 mL of red guava juice prepared from 100 g of red guava flesh and 250 mL of water once daily for seven consecutive days. Participants also received iron tablets according to the study program; the original manuscript states that the tablets were taken 30 minutes after consuming the juice. The exact elemental iron dose and tablet formulation must be verified from the product label or study records before submission. If the tablets used contained 60 mg elemental iron and 400 µg folic acid, these details may be reported only after confirmation. The control group received iron tablets alone.

Hemoglobin levels were measured before the intervention and on day 8 using the Quik-Check device, as reported in the original manuscript. The device model, measurement procedure, and quality-control steps should be specified if documented in the study records. Adherence to juice and iron-tablet consumption should also be reported based on the actual monitoring records; no adherence percentage has been inferred.

Descriptive statistics were used to summarize participant characteristics and hemoglobin levels. Normality was assessed using the Shapiro–Wilk test. A paired-samples t-test may assess pretest–posttest changes within each group when its assumptions are met. To determine whether changes differed between groups, an independent comparison of change scores or an appropriate repeated-measures analysis is required. Report the test statistic, exact p-value, effect estimate, and 95% confidence interval only after reanalysis of the individual participant data. The descriptive difference in mean changes calculated from the reported means is 0.40 g/dL (0.69 – 0.29); this is not, by itself, evidence of statistical significance.

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Ethical approval was obtained from the Health Research Ethics Committee of Universitas Malahayati, with approval number 5524/EC/KEP-UNMAL/VI/2025, as clarified by the authors. The final

manuscript should ensure that this number and the approval month match the official ethics approval letter and that participant consent procedures are described accurately.

RESEARCH RESULTS

Table 1. Characteristics of Respondents (N= 20)

Variable	Intervensi (n=10)	Control (n=10)
Age (Mean±SD) (Years) (Range)	25.00 ± 3.37 (20–30)	25.00 ± 3.37 (20–30)
20-30	10/100	10/100
<20 or >35	0/0	0/0
Education (n/%)		
Junior High School	3/30.0	0/0
Senior High School	6/60.0	7/70.0
Bachelor Degree	1/10.0	3/30.0
Occupation (n/%)		
Yes	5/50.0	5/50.0
No	5/50.0	5/50.0

Table 1 shows that all participants in both groups were aged 20–30 years (10/10; 100.0%), consistent with the eligibility criteria. In the intervention group, 6 (60.0%) had a senior high school education and 5 (50.0%) were employed. In the control group, 7 (70.0%) had a senior high school education and 5 (50.0%) were unemployed.

Table 2. Mean Hemoglobin (Hb) Levels Among Premarital Women Before and After Administration of Guava Juice and Iron (Fe) Tablets

Variable	Mean	SD	Min	Max	Shapiro-Wilk	Notes	P- Value
Hb Level Intervention Group							0.0001
Before	10.95	0.58	10.0	11.7	0.505	Normal	
After	11.64	0.66	10.5	12.3	0.088	Normal	
Hb Level Control Group							0.0001
Before	10.89	0.40	10.2	11.5	0.920	Normal	
After	11.18	0.41	10.5	11.7	0.430	Normal	

Table 2 shows that the mean hemoglobin (Hb) level among premarital women in the intervention group before the intervention was 10.95 g/dL (SD = 0.58), with a minimum of 10.0 g/dL and a maximum of 11.7 g/dL. After the intervention, the mean Hb level increased to 11.64 g/dL. In the control group, the mean Hb level before the intervention was 10.89 g/dL (SD = 0.40), with a minimum of 10.2 g/dL and a

maximum of 11.5 g/dL. After the intervention, the mean Hb level increased to 11.18 g/dL (SD = 0.41), with a minimum of 10.5 g/dL and a maximum of 11.7 g/dL.

The Shapiro–Wilk test results shown in Table 2 were greater than 0.05 for the reported measurements. The manuscript lists $p = 0.0001$ for the hemoglobin analysis; the authors must verify

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which statistical comparison this value represents. It should not be interpreted as evidence of a significant difference between groups unless a direct between-group analysis has been performed and reported.

DISCUSSION

The results showed that the mean hemoglobin (Hb) level in the intervention group increased from 10.95 ± 0.58 g/dL to 11.64 ± 0.66 g/dL. Red guava is a rich source of vitamin C, which enhances the absorption of non-heme iron by reducing ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}), a form that is more readily absorbed in the intestine (Almatsier et al., 2023). The combination of guava juice and iron tablets may improve Hb levels compared with iron supplementation alone because vitamin C facilitates iron absorption and has antioxidant properties that support blood health (Herlina, 2022).

These findings are consistent with previous studies reporting significant increases in Hb levels following the administration of guava juice combined with iron tablets among pregnant women with anemia (Yuliva et al., 2023; Anggraeni, 2023; Lestari, 2023). Other studies have also emphasized the importance of maternal nutrition in stunting prevention. These findings suggest that although combining guava juice with iron tablets may improve Hb levels, the outcomes may also be influenced by adherence to supplementation and individual physiological factors (Mariza, 2016).

In the control group, the mean Hb level increased from 10.89 ± 0.40 g/dL to 11.18 ± 0.41 g/dL. Iron tablets provide iron required for hemoglobin synthesis; however, iron absorption can be influenced by baseline iron stores, gastrointestinal health, and dietary inhibitors such as phytates, tannins, and calcium (Almatsier et al., 2019). The observed Hb increases of 0.1–0.5 g/dL in the control group suggest that iron supplementation alone may improve Hb levels, although the mean increase was smaller than that observed in the intervention group.

These findings are consistent with previous research indicating that iron supplementation can increase Hb levels, while the addition of vitamin C sources, such as guava juice, may enhance iron absorption. Therefore, anemia prevention and management should not rely solely on iron supplementation but should also include adequate nutritional intake, nutrition education, and improved

supplement-taking practices (Yuliva et al., 2023; Anggraeni, 2023; Lestari, 2023).

The statistical analysis yielded a p-value of 0.001 ($p < 0.05$), indicating a statistically significant difference associated with the intervention. Vitamin C in guava juice may contribute to this improvement by facilitating the reduction of Fe^{3+} to Fe^{2+} and enhancing the bioavailability of non-heme iron in the intestinal tract (Almatsier, 2019; Nufus, 2023). However, the interpretation of this finding should consider the statistical test used and whether the p-value represents a within-group comparison or a comparison between the intervention and control groups.

These findings are also consistent with studies reporting increased Hb levels among pregnant or postpartum women following the administration of guava juice and iron tablets (Listiarini et al., 2021). Red guava contains substantial amounts of vitamin C, which can enhance non-heme iron absorption (Nufus, 2023). In addition to vitamin C, guava contains other bioactive compounds, including flavonoids and lycopene, that have antioxidant properties. However, the extent to which these compounds directly affect Hb levels requires further investigation (Astutik et al., 2020).

The intervention group showed Hb increases ranging from 0.1 to 1.1 g/dL, compared with 0.1 to 0.5 g/dL in the control group. The largest increase in the intervention group (1.1 g/dL) occurred among respondents aged 23–31 years, whereas the smallest increase (0.1 g/dL) may have been influenced by factors such as adherence, dietary habits, baseline nutritional status, and individual physiological conditions. In the control group, the largest increase (0.5 g/dL) may also have been associated with differences in baseline iron status and dietary intake. These explanations remain hypothetical because the relevant factors were not directly assessed.

No consistent pattern was observed between age or educational level and the magnitude of Hb improvement in either group. This suggests that other factors, including nutritional status, dietary habits, and individual physiological conditions, may contribute to variations in Hb response. Overall, the intervention group demonstrated a greater mean increase in Hb levels than the control group. Nevertheless, a direct statistical comparison of the changes between groups is necessary to establish whether the combination of

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guava juice and iron tablets is significantly more effective than iron tablets alone.

CONCLUSION

Mean hemoglobin levels increased in both groups after the intervention period. The intervention group receiving red guava juice combined with iron tablets showed a greater descriptive increase than the control group receiving iron tablets alone. However, the additional effect of red guava juice cannot be confirmed until the between-group statistical analysis has been verified. Red guava juice may be considered a complementary dietary approach and should not replace iron supplementation or appropriate clinical management of anemia.

SUGGESTION

Premarital women are encouraged to consume iron (Fe) tablets regularly as recommended by health professionals, increase vitamin C intake from fruits such as guava and oranges, and avoid consuming tea or coffee close to iron supplementation. Health workers are encouraged to provide nutrition education, monitor iron tablet adherence, and promote vitamin C-rich foods to support anemia prevention. This study can serve as an academic reference for further research and community service related to improving hemoglobin levels and preventing anemia. Future studies should explore different research designs, additional variables, and alternative guava-based products to improve hemoglobin levels among premarital women.

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