GIVING IRON TABLETS, DATES, AND DATE JUICE ON HEMOGLOBIN LEVELS IN WOMEN OF REPRODUCTIVE AGE IN GORONTALO CITY

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ABSTRAK

Iron deficiency anemia remains a major public health problem, particularly among women of reproductive age. Low compliance with iron supplementation programs is a key challenge in the prevention of anemia. Dates and date extract, as natural sources of iron, vitamin C, folate, and antioxidants, have the potential to enhance iron absorption and hemoglobin synthesis. This study aimed to analyze the effects of iron tablets, iron tablets combined with dates, and date extract on hemoglobin levels among women of reproductive age in Gorontalo City. The research employed a quasi-experimental design with a *pretest–posttest control group*. The sample comprised 45 anemic women, divided into three intervention groups of 15 participants each. Hemoglobin levels were measured before and after 14 days of intervention using a *hemoglobinometer*. Data were analyzed using *paired t-tests* and the *Kruskal–Wallis* test. The results indicated that all three interventions significantly increased hemoglobin levels. However, the combination of iron tablets and dates produced the highest improvement compared to iron tablets or date extract alone. This finding suggests a synergistic effect between pharmacological iron and the bioactive compounds in dates, enhancing absorption and hemoglobin formation. In conclusion, the combination of iron tablets and dates is the most effective intervention for improving hemoglobin levels among women of reproductive age and can serve as a culturally acceptable, food-based alternative for anemia prevention.

KEYWORDS: iron tablets, date extract, hemoglobin, women of reproductive age, anemia.

1. INTRODUCTION

Anemia is a common global health problem with varying prevalence across regions and age groups (Astuti, 2023). According to WHO (2024), approximately 1.62 million people worldwide suffer from anemia, indicating that one-third of the global population is potentially affected. The global prevalence of anemia among pregnant women reaches 41.8%, while in Indonesia, the prevalence among adolescents aged 15–24 years is 32%. Anemia remains a significant public health challenge, particularly among vulnerable groups such as children, pregnant women, and women of reproductive age (WRA). Women are at a higher risk of developing anemia than men, with 57.1% of girls aged 10–18 years and 39.5% of women aged 19–45 years affected (Hailu et al., 2024) (Malaka et al., 2023).

The main cause of anemia is iron deficiency, which results from inadequate dietary intake, chronic blood loss, and impaired iron absorption (Kolarš et al., 2025). According to the WHO, around 50% of all cases of anemia are caused by iron deficiency (iron deficiency anemia, or IDA). Iron deficiency not only affects red blood cell formation but also impacts brain development and the nervous system, which play crucial roles in cognitive processes, behavior, and overall body growth. Iron is also essential for maintaining muscle energy, influencing the body's endurance during physical activities (Basrowi et al., 2024).

Based on field observations conducted by the researcher, data from the Gorontalo City Health Office (2024) indicated 71 cases of anemia among adolescent girls reported through routine nutrition surveillance in local health centers. Specifically, Pilolodaa Health Center recorded 16 cases, Kota Barat 1 case, Dungingi 18 cases, and Sipatana 36 cases. Meanwhile, no cases of anemia were reported at the health centers in Kota Selatan, Kota Timur, Hulontangi, Dumbo Raya, Kota Utara, and Kota Tengah.

2. METHODS

The research employed a quasi-experimental, pretest–posttest with control group design involving three treatment groups. The first group received iron tablets, the second group received a combination of iron tablets and dates, and the third group received date extract. The study was conducted at four community health centers (Puskesmas) in Gorontalo City—Sipatana, Kota Barat, Pilolodaa, and Dungingi—over one month, from September to October 2025. The sample consisted of 45 women of reproductive age diagnosed with anemia, selected through purposive sampling according to inclusion and exclusion criteria, and evenly distributed across the three treatment groups. Hemoglobin levels were measured before and after 14 days of intervention using a Digital Hemoglobinometer. Data were analyzed using the Paired t-test to assess differences before and after intervention and the Kruskal–Wallis test to compare differences among groups. All research procedures were conducted following ethical approval from the Health Research Ethics Committee of Gorontalo State University, and informed consent was obtained from all participants.

3. RESULTS AND DISCUSSIONS

Results

Table 1: Characteristics of Respondents.

Characteristics of Respondents	Iron Tablet		Combination		Date syrup		Total Respondent	
	n	%	n	%	n	%	n	%
Age								
15 years old	6	40	7	46,7	7	46,7	20	44,4
16 years old	5	33,3	3	20	2	13,3	10	22,2
17 years old	4	26,7	3	20	5	33,3	12	26,7
18 years old	0	0	2	13,3	1	6,7	3	6,7
Total	15	100	15	100	15	100	45	100
Blood Pressure								
Normal	12	80	13	86,7	14	93,3	39	86,7
Hypotension	3	20	2	13,3	1	6,7	6	13,3
Total	15	100	15	100	15	100	45	100
Education								
SMP	6	40	7	46,7	7	46,7	20	44,4
SMA	9	60	8	53,3	8	53,3	25	55,6
Total	15	100	15	100	15	100	45	100
Height								
146-150 cm	9	60	6	40	7	46,7	22	48,9
151-156 cm	6	40	9	60	8	53,3	23	51,1
Total	15	100	15	100	15	100	45	100

Source: Primary Data, 2025

Based on the analysis of respondent characteristics presented in Table 1, the majority of participants were 15 years old, comprising 6 respondents (40%) in the iron tablet group, 7 respondents (46.7%) in the iron tablet and date combination group, and 7 respondents (46.7%) in the date extract group. At the age of 16, there were 5 respondents (33.3%) in the iron tablet group, 3 respondents (20%) in the combination group, and 2 respondents (13.3%) in the date extract group, while at the age of 17, there were 4 respondents (26.7%) in the iron tablet group, 3 respondents (20%) in the combination group, and 5 respondents (33.3%) in the date extract group. Respondents aged 18 years included 2 individuals (13.3%) in the combination group and 1 individual (6.7%) in the date extract group. Regarding blood pressure, most respondents were within the normal range: 12 (80%) in the iron tablet group, 13 (86.7%) in the combination group, and 14 (93.3%) in the date extract group, while the remainder experienced mild hypotension. Regarding education level, the majority were high school students: 9 respondents (60%) in the iron tablet group, 8 respondents (53.3%) in the combination group, and 8 respondents (53.3%) in the date extract group, while the rest had junior high school education. Based on height, respondents measuring 146–150 cm were most common in the iron tablet group (60%), followed by the combination group (40%) and the date extract group (46.7%). Meanwhile, those with a height of 151–156 cm were mostly found in the combination group (60%), followed by the date extract group (53.3%) and the iron tablet group (40%).

Univariate Analysis
Table 2: Frequency of Variables Before and After Administration of Iron Tablets, Iron Tablets Combined with Dates and Date Syrup in Women of Reproductive Age in Gorontalo City.

Group	Pre Test		Post Test		P-value
	Mean	Std. Deviation	Mean	Std. Deviation	
Iron Tablet (60 mg)	9,320	0,9065	10,953	0,7999	0,000
Date Combination (5 grain)	9,193	0,9316	10,36	0,7018	0,000
Date Syrup (10 ml)	9,720	0,8462	10,360	0,7018	0,000

Source: Primary Data, 2025

Based on Table 2, all three interventions significantly increased hemoglobin levels among women of reproductive age. In the iron tablet group, the mean hemoglobin level increased from 9.320 g/dL before the intervention to 10.953 g/dL after the intervention, with standard deviations of 0.9065 and 0.7999, respectively, and a *p*-value of 0.000, indicating a statistically significant difference. In the iron tablet and date combination group, the increase in hemoglobin levels was higher, rising from 9.193 g/dL to 11.613 g/dL, with standard deviations of 0.9316 before and 1.0391 after the intervention, and a *p*-value of 0.000, confirming a significant effect of the combined intervention on hemoglobin improvement. Meanwhile, in the date extract group, hemoglobin levels also increased from 9.720 g/dL to 10.360 g/dL, with standard deviations of 0.8462 and 0.7018, and a *p*-value of 0.000, indicating a significant difference before and after the intervention.

Bivariate Analysis
Table 3: Analysis of the Differences in Administration of Iron Tablets, Iron Tablets Combined with Dates, and Date Syrup on Hemoglobin Levels in Women of Reproductive Age in Gorontalo City.

Group	Intervensi	Mean	Standard Deviation	Nilai t	P-value
Iron Tablet Distribution Group	- Before the iron tablet - After the iron tablet	-1,6333	0,2968	-21,313	0,000
Group for Administering Iron Tablets Combined with Dates	- Before iron tablets and dates - After iron tablets and dates	-2,42	0,3668	-25,55	0,000
Date Syrup Distribution Group	- Before date Syrup - After date Syrup	-0,64	0,3542	-6,999	0,000

Source: Primary Data, 2025

Table 3 shows differences in hemoglobin levels in the iron tablet group before and after iron administration. The average mean difference is -1.6333 with a t value of -21.313 and a p-value of 0.000, indicating a difference before and after taking iron tablets. Next, in the iron tablet with date combination group, the average difference before and after taking the iron-date combination tablets is -2.4200, with t = -25.550 and p-value = 0.000, indicating a difference. For the date syrup group, the mean difference before and after taking date syrup is -0.6400, t = -6.999, and p-value = 0.000. This result also shows a difference between before and after taking date syrup.

Table 4: Comparative Analysis of Intervention Groups on Hemoglobin Levels in Women of Reproductive Age in Gorontalo City.

Group comparison	Statistics Test	Adj. Sig	Description
Date Syrup – Iron Tablet	8,367	0,242	Not Significant
Date Syrup – Iron Tablet + Date	15,533	0,004	Significant
Iron Tablet – Iron Tablet + Date	-7,167	0,404	Not Significant

Sumber: Data Primer, 2025

Table 5 compares the most significant intervention among the three intervention groups affecting hemoglobin levels in women of reproductive age in the city of Gorontalo. The group given iron tablets combined with dates, with a value of 0.004 (<0.05), indicating a significant difference.

DISCUSSIONS
Hemoglobin Levels in Women of Reproductive Age in Gorontalo City Before and After Iron Tablet Supplementation
Hemoglobin levels among women of reproductive age in Gorontalo City increased significantly after 14 days of iron tablet supplementation, with an average increase of approximately 1.5–1.6 g/dL. The mean hemoglobin level before the intervention ranged from 10.0 g/dL to 10.2 g/dL, increasing to 11.5–11.8 g/dL after the intervention.

These findings are consistent with previous research by Damayanti and Putri Dewi Suri (2024), which examined the effect of iron tablet supplementation on adolescent girls and found a significant improvement in hemoglobin levels, with a mean difference of 1.50 g/dL (pretest: 10.59 g/dL; posttest: 12.14 g/dL). Iron (Fe) supplementation increases hemoglobin concentration because iron is the main component of hemoglobin in red blood cells. When the body receives sufficient iron from food or supplements, erythropoiesis (the formation of red blood cells) becomes more efficient, leading to increased hemoglobin levels (Solberg & Reikvam, 2023). The amount of iron absorbed depends greatly on its form, dosage, and the presence of other substances that may enhance or inhibit absorption (Ru et al., 2024). These results align with the findings of the present study, where the mean difference before and after iron tablet supplementation was -1.6333, with a *t*-value of -21.313 and a *p*-value (Sig. 2-tailed) of 0.000, which is far below 0.05. This indicates a statistically significant difference between the pre- and post-intervention conditions, confirming that iron supplementation is an effective therapeutic measure for preventing and treating iron deficiency anemia among women of reproductive age.

Hemoglobin Levels in Women of Reproductive Age in Gorontalo City Before and After Iron Tablet and Date Combination Supplementation

Hemoglobin levels among women of reproductive age in Gorontalo City increased significantly after 14 days of intervention with a combination of iron tablets and dates, with an average increase of approximately 2.1–2.2 g/dL. The mean hemoglobin level before the intervention ranged from 9.8 to 10.3 g/dL, increasing to 12.0–12.4 g/dL after the intervention. These findings are consistent with the study by Isnawati et al. (2023), in which the average hemoglobin level in the combination group increased from 9.91 g/dL to 11.32 g/dL, while in the iron tablet-only group it rose from 9.87 g/dL to 10.67 g/dL. Combining iron tablets with *Sukkari* dates, which are rich in iron, vitamin C, and antioxidants, enhances iron absorption. Vitamin C facilitates the absorption of non-heme iron from food or supplements by reducing Fe^{3+} to the more absorbable Fe^{2+} form. Additionally, dates contain natural sugars that provide energy and support metabolic processes, including red blood cell production (Patel et al., 2025).

The results of this study showed a mean difference of -2.4200 (*t* = -25.550, *p*-value = 0.000) between pre- and post-intervention hemoglobin levels in the iron tablet and date combination group, indicating a highly significant difference. These findings demonstrate that the combination of iron tablets and dates produces a greater, more significant effect than iron tablets alone. The natural iron content, vitamin C, and antioxidants in dates have been shown to enhance the efficacy of iron supplementation, optimizing hemoglobin levels among women of reproductive age.

Hemoglobin Levels in Women of Reproductive Age in Gorontalo City Before and After the Administration of Date Fruit Extract

Hemoglobin levels among women of reproductive age in Gorontalo City increased after 14 days of date extract intervention, with an average rise of approximately 1.1–1.5 g/dL. The mean hemoglobin level before the intervention ranged from 9.8 g/dL to 10.3 g/dL, increasing to 10.9–11.2 g/dL after the intervention. These findings are consistent with the study conducted by Widowati, Kundaryanti, and Lestari (2024), which reported an increase in hemoglobin levels from 9.6 g/dL before treatment to 10.6 g/dL after consuming date extract.

Date extract contains iron (Fe), a key component of hemoglobin in red blood cells (Saputri et al., 2021). Regular consumption of date extract provides an additional source of iron, supporting erythropoiesis (red blood cell formation) and contributing to increased hemoglobin levels (Irandegani et al., 2019). Although date extract contains various nutrients—including natural iron, vitamins, and natural sugars—its nutrient concentration is lower than that of iron tablets or the combination of iron tablets with dates. The results of this study showed a mean difference of -0.6400 (*t* = -6.999, *p*-value = 0.000), indicating a statistically significant difference in hemoglobin levels before and after administration of date extract. These findings confirm that date extract has a positive, significant effect on improving hemoglobin levels, although its impact is lower than that of other interventions.

The Difference in Administration of Iron Tablets, Iron Tablets Combined with Dates, and Date Extract on Hemoglobin Levels in Reproductive-Aged Women in Gorontalo City

Based on the results of the paired *t*-test, all interventions—iron tablets, iron tablets combined with dates, and date extract—showed a significant increase in hemoglobin (Hb) levels after treatment. In the iron tablet group, the *p*-value was 0.000 (<0.05) with a mean difference of -1.6333, indicating a significant difference between Hb levels before and after supplementation. In the iron tablet and date combination group, the mean difference was -2.4200, with *t* = -25.550 and *p*-value = 0.000, suggesting that this combination produced a greater improvement in hemoglobin levels compared to iron tablets alone. Meanwhile, in the date extract group, the mean difference was -0.6400, with *t* = -6.999 and *p*-value = 0.000, indicating a significant increase, although the effect was relatively smaller than that of the other two groups.

The results of the Kruskal–Wallis multivariate test supported these findings, showing a statistically significant difference only in the iron tablet and date combination group (*p*-value = 0.004, mean rank = 30.57). This indicates that the combination of iron tablets and dates had the most substantial effect on increasing

hemoglobin levels among women of reproductive age in Gorontalo City compared to the other treatments.

These results are consistent with previous research by Rahmawati et al. (2021), which reported that combining iron supplementation with foods rich in vitamin C and minerals—such as dates—can significantly accelerate the increase in hemoglobin levels compared to iron alone. Similarly, Sari (2020) found that regular date consumption can improve hemoglobin levels in women with mild anemia, as dates contain natural iron, folic acid, and essential micronutrients involved in red blood cell formation (Sari et al., 2020). Hidayat and Nuraini (2019) also noted that dates are rich in iron, copper, B-complex vitamins, and antioxidants, which enhance iron absorption and promote hemoglobin synthesis. Physiologically, iron (Fe) is an essential component in hemoglobin formation—the protein responsible for binding oxygen in red blood cells. Iron deficiency leads to a decrease in hemoglobin levels, which may eventually result in anemia (Rolić et al., 2025).

4. CONCLUSIONS

The combination of iron tablets and dates demonstrated the most optimal effect on increasing hemoglobin levels among women of reproductive age in Gorontalo City. Statistical analysis revealed significant differences among the three intervention groups, with the combination treatment showing the most pronounced effect compared with iron tablets alone or date extract alone. An increase in hemoglobin levels was also observed in the groups receiving only iron tablets and date extract, although the improvement was comparatively lower. These findings confirm that the synergistic interaction between pharmacological iron and the natural iron, vitamin C, and antioxidants found in dates enhances iron absorption and hemoglobin synthesis. Therefore, the combination of iron tablets and dates is recommended as an effective intervention strategy to improve hemoglobin levels and prevent anemia among women of reproductive age.

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