

## Boosting Hemoglobin: The Power of Dates and Honey for Third Trimester Pregnant Women

Nurseha<sup>1\*</sup>, Sri Utami Subagio<sup>1</sup>, Nurce Arifiati<sup>2</sup>, Deni Suwardiman<sup>3</sup>

<sup>1</sup> Faculty of Health Sciences, D3 Midwifery, Universitas Faletahan, Banten, Indonesia.

<sup>2</sup> Faculty of Health Sciences, Master of Public Health, Universitas Faletahan, Banten, Indonesia.

<sup>3</sup> Faculty of Health Sciences, Bachelor of Nursing and Professional Nurse, Universitas Faletahan, Banten, Indonesia.

Email: <sup>1\*</sup>seha.hendra110807@gmail.com, <sup>2</sup>amysubagio@gmail.com, <sup>3</sup>Nurcearifiati@gmail.com, <sup>4</sup>dsuwardiman@gmail.com

Email Penulis Korespondensi: seha.hendra110807@gmail.com

(\* : coresponding author)

**Abstract**—Anemia poses a significant health challenge, particularly among pregnant women, with Indonesia facing a notable burden in maternal mortality rates (MMR). This study investigates the efficacy of date fruit and honey supplementation in addressing anemia among third-trimester pregnant women attending Kramatwatu Community Health Center. Drawing on a quantitative approach with a quasi-experimental design, the research aims to elucidate the impact of this intervention on hemoglobin (HB) levels. The prevalence of anemia among pregnant women is alarming, with all respondents in the study experiencing anemia before the intervention. However, following the provision of date fruit and honey, a substantial increase in HB levels was observed, indicating a promising avenue for improving maternal health outcomes. Utilizing SPSS for analysis, univariate and bivariate analyses were conducted to describe variables and test intervention effects. The study underscores the potential effectiveness of date fruit and honey supplementation in ameliorating anemia among pregnant women, although further research is warranted to ascertain long-term efficacy and optimal dosages. Comprehensive interventions addressing nutritional deficiencies and healthcare access are crucial for advancing maternal health goals and reducing MMR in Indonesia.

**Keywords:** Anemia; Dates fruits; Honey; Supplementation; Pregnant Women

### 1. INTRODUCTION

Anemia stands as one of the leading causes of Maternal Mortality Rates (MMR) in Indonesia. According to the World Health Organization, globally, 46% of the population experiences anemia, with 68% of cases occurring in women. Based on the Basic Health Research, women with underlying health conditions or irregular menstrual cycles are more prone to experiencing anemia (WHO, 2019). Furthermore, the Basic Health Research indicates that women with pre-existing health conditions or irregular menstrual cycles are particularly susceptible to anemia, exacerbating their risk of complications. This underscores the critical need for targeted interventions and comprehensive health strategies to address anemia among women, particularly in low-resource settings like Indonesia. By improving nutritional intake, enhancing access to healthcare services, and promoting regular health screenings, it is possible to mitigate the impact of anemia and ultimately reduce the Maternal Mortality Rates in the country.

Anemia is a medical condition where the number of red blood cells or hemoglobin levels falls below normal. Normal hemoglobin levels typically vary between males and females. For males, anemia is defined as hemoglobin levels below 13.5 g/dl, while for females, it's below 12.0 g/dl. In women of reproductive age, hemoglobin levels below 12.0 g/dl indicate anemia, whereas during pregnancy, it's considered anemia if hemoglobin levels are below 11 g/dl. Pregnancy-induced anemia results from an increase in plasma volume during pregnancy, which dilutes the blood, a condition known as hemodilution, often reflected as anemia. Iron-deficiency anemia is commonly encountered during pregnancy (Putri & Hastina, 2020). This condition poses significant risks to both maternal and fetal health. Anemia during pregnancy can lead to several complications, including preterm delivery, low birth weight, and increased perinatal mortality. The mother is also at a higher risk of postpartum hemorrhage and may experience fatigue, weakness, and impaired immune function, which can affect her overall well-being and ability to care for her newborn.

The prevalence of anemia among pregnant women worldwide is estimated at 38.2%, highlighting it as a global health challenge of significant magnitude. This issue is particularly acute in Africa, where the prevalence stands at 44.6%, closely followed by Asia with a prevalence of 39.3% (Reni Yuli Astuti, 2018). In Indonesia, the prevalence of iron-deficiency anemia among pregnant women was 37.1% according to the 2013 Basic Health Research findings (Risksedas 2013), but it surged to 48.9% in 2018 (Risksedas 2018). Anemia prevalence varies across different age groups, with striking disparities evident in the 2018 data: 84.6% among women aged 15-24, 33.7% among those aged 25-34, 33.6% among the 35-44 age group, and 24% among women aged 45-54 (Widyarni et al., 2019). These statistics underscore the pressing need for targeted interventions to address the multifaceted factors contributing to anemia prevalence among pregnant women, aiming to mitigate its adverse health effects and reduce maternal mortality rates globally.

Indonesia holds the highest Maternal Mortality Ratio (MMR) among other ASEAN countries. Several primary causes of maternal deaths include hemorrhage (28%), eclampsia (24%), anemia (51%), and infections (11%). Therefore, it can be concluded that anemia significantly contributes to pregnancy complications. Anemia also impacts the childbirth process and postpartum period, highlighting the crucial need for special attention from healthcare providers in addressing it (R.D. Rahayu, 2017). Based on data from Risikedas (2018), the prevalence of anemia among pregnant women in Indonesia remains relatively high, both in rural areas (37.9%) and urban areas (38.2%). This prevalence is lower than the

2016 target of reducing the prevalence of anemia to 28%. These figures indicate that Indonesia's target to reduce the incidence of anemia has not been achieved. The prevalence has surpassed the threshold for severe public health issues (Severe et al., 2019) and has exceeded the interval threshold set by the WHO. Therefore, the occurrence of anemia among pregnant women in Indonesia is a severe public health problem that requires special attention from the government (Soleha et al., 2020). This situation underscores the urgency for comprehensive interventions and strategies to address anemia effectively, particularly focusing on vulnerable populations in both rural and urban settings. Failure to address this issue adequately could lead to persistent health disparities and hinder progress towards achieving maternal health goals and reducing maternal mortality rates in the country.

Hemoglobin is a component of red blood cells used to determine anemia status. Iron is required in the body for hemoglobin formation. When iron stores are depleted, hemoglobin synthesis is disrupted. Anemia occurs when hemoglobin levels fall below normal. The normal range for hemoglobin levels in women is 12-16 g/dl (Cahyati, 2020). Anemia is a condition characterized by a deficiency of red blood cells in the body, resulting in insufficient hemoglobin levels. Hemoglobin, found in red blood cells, plays a crucial role in transporting oxygen to all tissues in the human body. In the context of pregnancy, anemia refers to a condition where pregnant women have a hemoglobin level <11 g/dl during the first and third trimesters, or a hemoglobin level <10.5 mg/dl during the second trimester (Manuba, 2019).

One current strategy is to focus on improving community nutrition as part of the efforts to achieve optimal public health. To accomplish this goal, initiatives must be implemented to reduce the prevalence of various health issues, including iron-deficiency anemia (IDA). One such initiative involves implementing programs addressing the four major nutritional problems, with a particular focus on preventing iron-deficiency anemia (Sinaga, 2019). In addition, the government has contributed by providing iron supplements to pregnant women throughout their pregnancy. However, the prevalence of anemia in Indonesia remains high, largely influenced by various factors, including compliance with medication. One alternative approach to prevent anemia is to incorporate high-nutrient and iron-rich foods or fruit juices into the diet. Some examples include red beans, honey, dates, oranges, and beets. These foods not only provide essential nutrients but also contribute to overall health and well-being during pregnancy. Encouraging the consumption of such foods can complement existing interventions and help address the persistent challenge of anemia among pregnant women in Indonesia. Moreover, community education and awareness campaigns can play a crucial role in promoting the importance of a balanced diet rich in iron and other essential nutrients for maternal and child health. By empowering women with knowledge about nutrition and providing access to diverse and nutritious food options, we can work towards reducing the burden of anemia and improving maternal health outcomes in Indonesia.

Research conducted by Dona R (2021) revealed the impact of date consumption on the hemoglobin levels of pregnant women during pregnancy. This is attributed to the fact that dates contain essential nutrients required by the body, and their sugar content is easily digestible. Furthermore, another study indicated that out of 15 articles reviewed, date consumption was found to increase hemoglobin levels in pregnant women with mild to moderate anemia. In a previous study by Andi Hariati et al. (2020), it was noted that honey supplementation among pregnant women with anemia showed a positive correlation with increased hemoglobin levels. The mineral content in honey aids in the production of hemoglobin in the blood. These findings underscore the potential benefits of incorporating dates and honey into the diets of pregnant women as interventions to improve hemoglobin levels and combat anemia. Encouraging the consumption of these natural sources of nutrients could complement existing strategies for managing anemia during pregnancy, ultimately contributing to better maternal and fetal health outcomes.

Phoenix dactylifera L, commonly known as dates, is a type of palm tree whose fruits are renowned for their sweet taste, making them widely consumed by many people (Chao & Krueger, 2019). Dates are indeed rich in nutrients, containing significant amounts of iron, calcium, phosphorus, zinc, selenium, magnesium, vitamin B complex, vitamin C, and vitamin K. In the Quran, dates are mentioned frequently. Surahs such as Ar-Rad, Maryam, Al-Baqarah, Al-Hashr, and Qaaf mention dates. Additionally, dates are referenced in many hadiths of the Prophet Muhammad (Kasriana, 2019). The richness of nutrients in dates makes them not only a delicious snack but also a valuable addition to a healthy diet. Their historical and religious significance further adds to their cultural importance. Incorporating dates into one's regular diet can provide various health benefits, including improved iron levels, enhanced bone health, and bolstered immune function. Furthermore, the versatility of dates allows them to be enjoyed in various forms, such as fresh, dried, or as a natural sweetener in recipes. Overall, dates stand as a testament to the intersection of nutritional value, cultural heritage, and religious symbolism in the realm of food.

Furthermore, honey is also an alternative that can be consumed to increase the hemoglobin levels in pregnant women. Honey is a highly beneficial liquid produced by bees from the nectar of various plants. It contains numerous erythrocyte-forming substances, such as minerals, and is rich in vitamins. Additionally, the iron in honey can enhance the number of erythrocytes in human blood, thereby increasing the hemoglobin levels. Honey's natural composition makes it not only a delicious sweetener but also a valuable source of nutrients with potential health benefits. Its ability to support erythrocyte production and improve hemoglobin levels makes it particularly beneficial for pregnant women, who often require additional nutrients to support their own health and the development of their growing fetus. Incorporating honey into one's diet can be a simple yet effective way to address nutritional deficiencies and promote overall well-being during pregnancy.

Based on the preliminary study conducted in collaboration with the Maternal and Child Health (MCH) program at the Kramatwatu Health Center in Serang, Banten, there has been a concerning trend of high anemia rates among pregnant women. In 2022, out of 132 pregnant women who underwent hemoglobin testing, 75 were found to be anemic. This figure increased in 2023, with 97 out of 167 pregnant women diagnosed with anemia. Additionally, from January to March 2024, 54 pregnant women were tested for hemoglobin levels, with 31 being diagnosed with anemia. These findings prompted the initiation of a research study titled "The Effect of Date Fruit and Honey Consumption on Increasing Hemoglobin Levels in Pregnant Women in the Third Trimester at the Kramatwatu Health Center, Serang, Banten."

This research aims to explore the potential benefits of date fruit and honey consumption in addressing the persistent issue of anemia among pregnant women in the third trimester. By investigating the impact of these natural remedies on hemoglobin levels, the study seeks to contribute valuable insights into alternative interventions for improving maternal health outcomes. Furthermore, the collaboration with the local health center ensures that the findings can directly inform and potentially enhance the existing maternal and child health programs in the community. Through this research endeavor, efforts are being made to address the specific health needs of pregnant women and ultimately promote healthier pregnancies and childbirth experiences in the region.

## 2. RESEARCH METHODS

This research employs a quantitative approach with a quasi-experimental method. This approach is chosen to systematically and carefully address the research problem, aiming to obtain comprehensible facts and conclusions (Syamsuddin & Damayanti, 2017). The research design utilized is the one-group pretest-posttest design, with the independent variable being the consumption of dates and honey, and the dependent variable being the HB levels. The population consists of all third-trimester pregnant women at the Kramatwatu Health Center totaling 15 individuals. The research sample also comprises 15 third-trimester pregnant women, selected through total sampling. Inclusion and exclusion criteria are established to select samples that align with the research objectives. The study is confined to third-trimester pregnant women at the Kramatwatu Health Center with data collection conducted through interviews and monitoring of date and honey consumption. The research location is at the Kramatwatu Health Center Serang, conducted between January – March 2024. The independent variable is the provision of dates and honey, while the dependent variable is the hemoglobin levels of third-trimester pregnant women. Covariates include iron tablet intake, nutritional intake, and diseases that may affect HB levels. The provision of dates and honey is defined as administering 100 mg/day of dates and 2 tablespoons/day of honey to third-trimester pregnant women for two weeks. Hemoglobin levels are measured before and after the provision of dates and honey using a standard HB measurement tool. Observations are conducted to monitor the provision of dates and honey, while HB levels are measured using the HB Sahli method. The measurement process involves equipment and patient preparation, as well as sterile blood sampling procedures. Primary data are obtained through hemoglobin level examinations, while secondary data are derived from respondent identities and other supporting data. Data collection techniques include interviews and observations. Pre-research stages involve preliminary studies, obtaining permission from relevant authorities, and sample selection. The research is conducted in compliance with established health protocols and involves informed consent procedures, as well as pre-test and post-test phases. Data analysis is performed using SPSS, employing univariate analysis to describe each variable and bivariate analysis to test the effect of dates and honey provision on hemoglobin levels. Normality tests are conducted using Kolmogorov-Smirnov, and analysis utilizes T-Test or Wilcoxon depending on data distribution.

## 3. RESULT AND DISCUSSION

The total number of samples studied was 15 people. The data obtained from the research results were then organized into a frequency distribution table. The univariate and bivariate analyses in this study can be seen in the following table 1.

The table below outlines the characteristics of respondents involved in the intervention study. This data includes the distribution of respondents based on age, education, occupation, and parity. Understanding these characteristics is crucial for interpreting the study's findings and ensuring the representativeness of the sample.

**Table 1.** Characteristic of Respondents

Characteristics		Intervention	
		Frequency	%
Age	>35 Years	3	20,0
	20-35 Years	12	80,0
Education	Elementary High School	12	80,0
	High School	3	20,0
Occupation	Employed 10 67%	10	67,0
	Unemployed	5	33,0
Parity	Primipara	5	33,0
	Multigravida	10	67,0
Total		15	100

Source: Primary Data 2024

Based on the analysis in Table 1, it can be concluded that the majority of third-trimester pregnant women who underwent the intervention were in the age range of 30-35 years, totaling 12 individuals or approximately 80%. From these figures, it can be identified that most of them are not classified as high-risk pregnancies. On the other hand, there were 3 third-trimester pregnant women aged over 35 years, representing around 20% of the total research subjects, and they fall into the high-risk category. Additionally, in terms of parity, there were 5 primigravida third-trimester pregnant women, accounting for about 33% of the total, while 10 multigravida pregnant women, making up around 67%. In terms of education, the majority of pregnant women had primary education, with 12 individuals or about 80%, while only a small proportion had secondary education, totaling 3 individuals or about 20%.

The demographic analysis presented in Table 1 offers valuable insights into the characteristics of the third-trimester pregnant women who participated in the intervention. The findings suggest that the majority of participants, approximately 80%, were aged between 30-35 years, indicating that they were predominantly in the prime childbearing age group. This demographic profile aligns with typical pregnancy demographics, where women in their thirties are more likely to become pregnant. Moreover, the prevalence of pregnant women aged over 35 years, constituting around 20% of the sample, highlights the presence of older mothers who may face increased risks during pregnancy due to advanced maternal age. This observation underscores the importance of tailored antenatal care and monitoring for older pregnant women to mitigate potential complications.

Regarding parity, the data reveal that approximately one-third of the participants were primigravida, while two-thirds were multigravida. This distribution reflects a mix of first-time mothers and those with previous childbirth experiences. Primigravida women may require additional support and education regarding pregnancy and childbirth compared to multigravida women who have prior experience. Conversely, multigravida women may have unique healthcare needs related to previous pregnancies and births, emphasizing the importance of personalized care to address individual requirements effectively. In terms of educational attainment, the majority of pregnant women had primary education, while a smaller proportion had secondary education. This educational distribution reflects the broader socioeconomic context and access to education in the study population. Limited educational attainment may impact health literacy and access to healthcare services among pregnant women, potentially influencing pregnancy outcomes. Therefore, efforts to improve health literacy and access to maternal healthcare services, particularly among women with lower educational levels, are crucial to ensuring positive pregnancy outcomes and maternal well-being. These demographic characteristics provide important context for understanding the population of third-trimester pregnant women participating in the intervention. While the study sample represents a diverse range of ages, parity statuses, and educational backgrounds, certain demographic factors such as advanced maternal age and lower educational attainment may pose specific challenges and considerations in antenatal care delivery. Tailoring interventions and healthcare services to address the unique needs of different demographic groups can optimize pregnancy outcomes and contribute to maternal and child health. Further research focusing on the intersection of demographic factors and pregnancy outcomes is warranted to inform targeted interventions and improve maternal healthcare delivery (Hamilton et al., 2020).

This condition poses significant risks to both maternal and fetal health. Anemia during pregnancy can lead to several complications, including preterm delivery, low birth weight, and increased perinatal mortality. The mother is also at a higher risk of postpartum hemorrhage and may experience fatigue, weakness, and impaired immune function, which can affect her overall well-being and ability to care for her newborn. Iron-deficiency anemia, the most prevalent form of anemia during pregnancy, occurs due to insufficient iron intake, increased iron demands, and often inadequate iron stores before conception. The body's requirement for iron significantly increases during pregnancy to support the growing fetus and placenta and to accommodate the expansion of maternal red blood cell mass. However, dietary iron alone may not be sufficient to meet these increased demands, making supplementation crucial for many pregnant women.

Preventive measures and early detection are vital in managing anemia during pregnancy. Regular prenatal check-ups that include hemoglobin level assessments can help identify anemia early. Iron supplementation, either through diet or iron tablets, is a common preventive strategy. Foods rich in iron, such as lean meats, leafy green vegetables, and

fortified cereals, should be included in the diet. Additionally, vitamin C enhances iron absorption and should be consumed in conjunction with iron-rich foods. Educational programs aimed at increasing awareness about the importance of iron intake during pregnancy can also play a significant role. Pregnant women should be informed about the signs and symptoms of anemia, such as excessive fatigue, paleness, and shortness of breath, and encouraged to seek medical advice if these symptoms occur.

Furthermore, addressing underlying health conditions that may contribute to anemia, such as parasitic infections and chronic diseases, is crucial. Healthcare providers should ensure that pregnant women receive comprehensive care that includes not only nutritional support but also treatment for any other health issues that may exacerbate anemia. In summary, anemia is a prevalent and serious condition during pregnancy that requires a multifaceted approach for prevention and management. By ensuring adequate iron intake, regular monitoring, and comprehensive healthcare, the risks associated with anemia can be significantly reduced, leading to better outcomes for both mother and child.

The table below presents the frequency distribution of hemoglobin (HB) levels among third-trimester pregnant women at the Kramatwatu Community Health Center before the intervention involving the consumption of dates and honey. The table includes detailed information on the frequency, percentage, and mean of HB levels recorded in the participants. This baseline data is essential for comparing the changes in hemoglobin levels after the intervention and evaluating its effectiveness.

**Table 2.** Frequency Distribution of the Effect of Date and Honey Consumption on Third-Trimester Pregnant Women at Kramatwatu Community Health Center Before Intervention

HB Levelg/dl	Frequency	%	Mean
9,2	1	6,7	
10	2	13,3	
9,3	1	6,7	
10,2	1	6,7	
10	1	6,7	
10,4	1	6,7	9,793
10	1	6,7	
9,9	1	6,7	
9,0	3	20	
10,3	3	20	

*Source: Primary Data 2024*

Based on Table 2, it can be observed that there are 3 respondents (20%) of third-trimester pregnant women with the lowest HB level at 9.0 g/dL, and 1 respondent (6.7%) with the highest HB level at 10.54 g/dL. The average hemoglobin level of third-trimester pregnant women before consuming dates and honey is 9.793 g/dL.

The data presented in Table 2 provides valuable insights into the hemoglobin (Hb) levels of third-trimester pregnant women before consuming dates and honey. The analysis reveals a range of Hb levels among the respondents, with 20% having the lowest recorded Hb level at 9.0 g/dL, indicating severe anemia, while 6.7% exhibited the highest Hb level at 10.54 g/dL. These findings underscore the variability in Hb levels among pregnant women, highlighting the importance of early screening and intervention to address anemia, a common concern during pregnancy. The average Hb level of third-trimester pregnant women before the intervention was 9.793 g/dL. This average falls below the normal range for Hb levels during pregnancy, which is typically above 11 g/dL. The prevalence of low Hb levels among pregnant women is concerning as it can lead to adverse maternal and fetal outcomes, including increased risk of preterm birth, low birth weight, and maternal mortality. Therefore, addressing anemia in pregnancy is paramount to ensure the well-being of both mother and child (Al-Farsi YM, 2017).

The findings underscore the importance of nutritional interventions such as the consumption of dates and honey in improving Hb levels among pregnant women. Dates and honey are rich sources of iron and other essential nutrients that play a crucial role in hemoglobin synthesis and overall maternal health. By incorporating these natural dietary supplements into pregnant women's diets, healthcare providers can potentially mitigate the risk of anemia and its associated complications. However, while the intervention shows promise in improving Hb levels among pregnant women, further research is needed to evaluate its efficacy and optimal dosage. Longitudinal studies assessing the impact of date and honey consumption on Hb levels throughout pregnancy and its influence on maternal and neonatal outcomes are warranted. Additionally, considering individual variations in dietary preferences and tolerances, personalized dietary recommendations may enhance the effectiveness of nutritional interventions in addressing anemia during pregnancy (McCance KL, 2019).

Furthermore, addressing socioeconomic factors, access to healthcare, and cultural beliefs surrounding dietary practices are essential to ensure the successful implementation of nutritional interventions in diverse populations. Collaborative efforts between healthcare providers, policymakers, and community stakeholders are necessary to develop comprehensive strategies to combat anemia and promote maternal health during pregnancy.

The table below illustrates the frequency distribution of hemoglobin (HB) levels among third-trimester pregnant women at the Kramatwatu Community Health Center after the intervention involving the consumption of dates and honey. The table provides detailed information on the frequency, percentage, and mean of HB levels recorded in the participants. This data helps in understanding the impact of the dietary intervention on the hemoglobin levels of the pregnant women.

**Table 3.** Frequency Distribution of the Effect of Date and Honey Consumption on Third-Trimester Pregnant Women at Kramatwatu Community Health Center After Intervention

HB Levelg/dl	Frequency	%	Mean
10,6	3	20	10,727
11,4	1	6,7	
10,1	3	20	
11,1	1	6,7	
11,1	1	6,7	
12,1	1	6,7	
10,3	2	13,3	
11,7	1	6,7	
10,8	1	6,7	
10	1	6,7	

Source: Primary Data 2024

Based on Table 3, it is evident that there is 1 respondent (6.7%) among third-trimester pregnant women with the lowest HB level at 10.0 g/dL, and 1 respondent (6.7%) with the highest HB level at 12.1 g/dL. The average hemoglobin level of third-trimester pregnant women after consuming dates and honey is 10.727 g/dL.

The data presented in Table 3 provides valuable insights into the hemoglobin (Hb) levels of third-trimester pregnant women after consuming dates and honey. The analysis reveals a range of Hb levels among the respondents, with 6.7% having the lowest recorded Hb level at 10.0 g/dL and the same percentage exhibiting the highest Hb level at 12.1 g/dL. These findings indicate variability in Hb levels among pregnant women even after the intervention, highlighting the complexity of addressing anemia during pregnancy. The average Hb level of third-trimester pregnant women after the intervention was 10.727 g/dL. This average reflects an improvement in Hb levels compared to pre-intervention levels, suggesting the potential efficacy of consuming dates and honey in increasing Hb levels among pregnant women. The increase in Hb levels is encouraging as it signifies progress in addressing anemia, a common concern during pregnancy that can have detrimental effects on maternal and fetal health.

Several theories support the effectiveness of date and honey consumption in improving Hb levels among pregnant women. Both dates and honey are rich sources of iron, a key component of hemoglobin, which plays a crucial role in oxygen transport in the body. Additionally, honey contains antioxidants that may help reduce oxidative stress and inflammation, contributing to overall health and well-being. Furthermore, the combination of dates and honey provides a balanced source of carbohydrates and other essential nutrients, supporting energy levels and overall nutritional status during pregnancy (Al-Farsi YM, 2017).

Moreover, the natural sweetness of dates and honey makes them palatable and easy to incorporate into the diet, addressing potential barriers to dietary compliance among pregnant women. The simplicity and accessibility of these dietary interventions make them feasible options for improving Hb levels and overall nutritional status during pregnancy, particularly in resource-limited settings where access to fortified foods or supplements may be limited. While the findings suggest a positive impact of date and honey consumption on Hb levels among pregnant women, it is essential to consider potential limitations of the study. Factors such as individual dietary habits, compliance with the intervention, and concurrent use of other supplements or medications may influence the observed outcomes. Additionally, the relatively small sample size and lack of a control group limit the generalizability of the findings. Future research with larger sample sizes, randomized controlled trials, and longer follow-up periods are warranted to validate these findings and elucidate the mechanisms underlying the observed effects (McCance KL, 2019).

Overall, the results of the study support the potential of dietary interventions involving date and honey consumption in improving Hb levels among third-trimester pregnant women. However, further research is needed to confirm these findings and optimize intervention strategies for addressing.

The following table presents the results of the effect of giving dates and honey on hemoglobin levels in third-trimester pregnant women. The analysis was conducted using an independent samples t-test to compare the mean differences between the treatment and control groups. Levene's test was performed to assess the equality of variances, and the t-test for equality of means provided the significance values, mean differences, and confidence intervals.

**Table 4.** The effect of giving Dates and Honey on Hemoglobin Levels in Third-Trimester Pregnant Women

		Independent Samples Test							
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Hasil	Equal variances assumed	.206	.653	-4.352	28	.000	-.9333	-1.3726	-.4940
	Equal variances not assumed			-4.352	27.139	.000	-.9333	-1.3733	-.4934

Source: Primary Data 2024

In Table 4, it can be seen that the probability value (sig. 2-tailed) with the t-test is 0.000. According to Santoso (Septi, 2013), "To conduct a one-tailed hypothesis test, the sig. (2-tailed) value must be divided by two." So,  $0.000/2=0.000$ . Because the probability value is smaller than 0.05,  $H_0$  is rejected or there is an effect of giving Dates and Honey on Hemoglobin Levels in Third-Trimester Pregnant Women. Furthermore, from the output table above, it is known that the "mean difference" value is 0.9333. This value indicates the difference in the average hemoglobin levels before and after the intervention of giving dates and honey (10.727-9.793).

The results of the research indicate that there is a significant influence of Date Fruit and Honey consumption on Hemoglobin Levels in Third Trimester Pregnant Women ( $p=0.000$ ). This finding suggests that the consumption of date fruit and honey has the potential to affect the occurrence of anemia in third trimester pregnant women. This phenomenon can be explained by the nutritional content found in date fruit and honey, including protein, carbohydrates, and fats. According to Sotolu et al. (2018), these nutrients play a crucial role in supporting the synthesis of hemoglobin (Hb), which is a key factor in preventing and treating anemia in pregnant women. Therefore, the provision of Date Fruit and Honey can be considered as one of the effective strategies in increasing hemoglobin levels and reducing the risk of anemia in third trimester pregnant women.

A study conducted by Widowati et al. (2019) suggests that date fruit extract can enhance hemoglobin levels. High iron content can be utilized in the treatment of anemia. Anemia is characterized by a deficiency in the number of red blood cells or the amount of hemoglobin (the oxygen-carrying protein) within red blood cells falling below normal levels. Iron present in dates is subsequently absorbed by the intestines and transported by the bloodstream for hemopoiesis (the process of blood formation). Another study indicates that the methanol extract of raw date fruit exhibits properties supportive of enhancing erythropoietin synthesis by the liver to stimulate the bone marrow to produce more red blood cells (Pertiwi, 2014). Dates and honey, rich in their contents, contain components that can enhance iron absorption or play a role in the formation of red blood cells where hemoglobin resides. Date fruit and honey contain various vitamins, minerals, antioxidants, etc. Iron absorption in the body is closely related to the acidic environment that aids iron absorption, which occurs in the first and second parts of the small intestine. Therefore, iron absorption is enhanced by simultaneous administration of acidic compounds, such as Vitamin C or ascorbic acid. The Vitamin C contained in date fruit and honey can also increase iron absorption, especially by reducing ferric iron to ferrous iron. The richness of dates and honey in various nutrients underscores their potential in promoting overall health, particularly in addressing conditions like anemia. Iron is a critical component for the synthesis of hemoglobin, the protein responsible for oxygen transport in the blood. However, iron absorption can be influenced by several factors, including dietary components and the body's physiological environment. The presence of Vitamin C in date fruit and honey not only contributes to their nutritional value but also facilitates iron absorption by converting non-absorbable ferric iron into a more readily absorbable form, ferrous iron. This synergy between iron-rich foods like dates and honey and Vitamin C illustrates the importance of balanced nutrition in optimizing health outcomes.

In addition to its role in converting ferric to ferrous iron prior to intestinal absorption, vitamin C also regulates iron homeostasis by inhibiting hepcidin expression (for example, in HepG2 cells), making vitamin C potentially helpful in alleviating iron deficiency (Abu-Ouf & Jan, 2015). Vitamin C's influence on iron metabolism extends beyond its direct effect on iron absorption. Hepcidin is a key regulator of iron homeostasis, controlling iron absorption in the intestines and iron release from cells. By inhibiting hepcidin expression, vitamin C promotes increased iron absorption and availability, thus potentially mitigating iron deficiency. This mechanism highlights the multifaceted role of vitamin C in maintaining optimal iron levels in the body and underscores its significance in combating iron-related disorders such as anemia.

The metabolism of vitamin A found in date fruit and honey has implications for iron homeostasis, thus a deficiency in vitamin A can lead to iron deficiency (Apriyanti, 2021). The formation of red blood cells is greatly influenced by the presence of vitamin B12 and folate. Vitamin B12 activates folate, and active forms of folate can repair cell functions such as bone marrow. Vitamin B12 also acts as a cofactor for two types of enzymes in humans, namely methionine synthase and methylmalonyl-CoA mutase. The methionine synthase reaction involves folate (Widowati et al., 2019). The interplay

between vitamins A, B12, and folate underscores the complexity of nutrient interactions in maintaining optimal health. Vitamin A deficiency can disrupt iron homeostasis, leading to potential iron deficiency anemia. Meanwhile, the synergistic relationship between vitamin B12 and folate is crucial for the proper formation of red blood cells, with folate playing a key role in DNA synthesis and repair, particularly in rapidly dividing cells like those found in the bone marrow. Additionally, vitamin B12's role as a cofactor for essential enzymes highlights its significance in various metabolic processes, including those involved in folate metabolism. This interconnectedness emphasizes the importance of a balanced and varied diet rich in essential nutrients to support overall health and prevent nutritional deficiencies.

Another study revealed a correlation between date consumption and hemoglobin levels. In a sample size of 20, where 10 samples were administered dates as the treatment group (50%), and 10 samples were not given any date treatment as the control group (50%), results indicated an increase in Hb levels from 10.56 g/dL to 11.02 g/dL (Hidayah et al., 2018). This study provides further evidence of the potential benefits of date consumption in improving hemoglobin levels. By dividing the sample into treatment and control groups, researchers were able to compare the effects of date consumption directly. The significant increase in Hb levels observed in the treatment group suggests that dates may indeed have a positive impact on hemoglobin synthesis or absorption. However, further research with larger sample sizes and controlled conditions is warranted to validate these findings and elucidate the underlying mechanisms of action. Nonetheless, these results contribute to the growing body of literature supporting the nutritional value of dates and their potential role in promoting health, particularly in addressing conditions related to blood health such as anemia.

In this study, the "mean difference" value was found to be 0.9333. This value indicates the average difference in hemoglobin levels before and after the intervention of date fruit and honey consumption (10.727 - 9.793). This signifies an increase in hemoglobin levels among third-trimester pregnant women. The calculated mean difference provides quantitative insight into the effectiveness of the intervention. A positive value suggests that, on average, hemoglobin levels increased following the consumption of date fruit and honey. This finding is particularly significant for pregnant women in their third trimester, as adequate hemoglobin levels are crucial for both maternal and fetal health. The observed increase in hemoglobin levels indicates the potential of date fruit and honey as dietary supplements to address or prevent anemia in this population. Further analysis of the data, including statistical significance testing and consideration of potential confounding factors, would provide a more comprehensive understanding of the intervention's impact. Nonetheless, these findings contribute valuable evidence to the discussion on the nutritional benefits of date fruit and honey, especially in the context of maternal health during pregnancy.

These findings are supported by a study conducted by Tambuwun et al. (2019) involving 30 pregnant women, divided into two groups: 15 pregnant women in the control group and 15 pregnant women in the intervention group. The research results indicate that the administration of date fruit and honey extract can increase hemoglobin levels in pregnant women with anemia who received the intervention, showing an increase of 1.10 g%. The provision of date fruit and honey extract can increase hemoglobin levels in 100 pregnant women with anemia, with an average increase of 1.1 g% and statistically significant with a significance value of 0.000. This study adds further weight to the evidence supporting the effectiveness of date fruit and honey in improving hemoglobin levels, particularly in pregnant women with anemia. By comparing control and intervention groups and analyzing statistical significance, researchers were able to demonstrate the tangible impact of date fruit and honey supplementation on hemoglobin levels. The substantial increase observed in hemoglobin levels among pregnant women with anemia underscores the potential of these natural dietary supplements in addressing nutritional deficiencies during pregnancy. However, further research with larger sample sizes and longer intervention periods is needed to validate these findings and explore potential mechanisms underlying the observed effects. Nonetheless, these results contribute valuable insights into the potential role of date fruit and honey in maternal health promotion and anemia prevention during pregnancy.

## 4. CONCLUSION

In conclusion, the study revealed a high prevalence of anemia among third-trimester pregnant women attending Kramatwatu Community Health Center before intervention, with all respondents (100%) experiencing anemia. However, following the intervention involving the provision of date fruit and honey, a significant increase in hemoglobin levels was observed among most third-trimester pregnant women. The calculated "mean difference" value of 0.9333 indicates a notable rise in hemoglobin levels post-intervention. These findings suggest the potential effectiveness of date fruit and honey supplementation in improving hemoglobin levels among pregnant women with anemia. However, further research is warranted to explore the long-term effects and optimal dosage of this intervention. Additionally, addressing other contributing factors to anemia, such as nutritional deficiencies and access to healthcare, should be considered in future studies to provide comprehensive interventions for maternal health improvement.

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