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The Effect of Date Consumption on Increasing Hemoglobin Levels in Female Teenagers at State Senior High School 2 Rambah Hilir

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Abstract

Background: *Anemia remains a significant public health challenge among adolescents, particularly female teenagers, with over 30% of the global population affected and 40-88% prevalence in developing countries including Indonesia. Female adolescents face tenfold higher anemia risk due to menstruation, inadequate nutrition, and rapid growth demands.* ***Objective:*** *This study aimed to determine the effect of date consumption on increasing hemoglobin levels in female adolescents at State Senior High School 2 Rambah Hilir.* ***Methods:*** *This quantitative study employed a pre-experimental design with one-group pretest-posttest approach. The population comprised 25 female adolescents in class X showing anemia symptoms. Saturated sampling technique was used, resulting in 25 participants, though only 20 completed the intervention. Data collection utilized Easy Touch GCHb device for hemoglobin measurement and observation sheets. Participants consumed dates for seven consecutive days. Data analysis employed univariate and bivariate analyses using SPSS, specifically the Dependent T-test.* ***Results:*** *Pre-intervention hemoglobin levels averaged 10.01 gr/dL (range: 8.10-11.50 gr/dL), increasing significantly to 12.80 gr/dL (range: 10.13-17.20 gr/dL) post-intervention. The Dependent T-test yielded p-value = 0.000 < 0.05, indicating statistical significance.* ***Conclusion:*** *Date consumption significantly increases hemoglobin levels in female adolescents, providing evidence for dates as an effective non-pharmacological intervention for anemia prevention and management in this vulnerable population.*

Keywords: *Adolescent Health, Anemia Prevention, Date Consumption, Hemoglobin Levels, Nutritional Intervention*

INTRODUCTION

Adolescence, typically spanning ages 10 to 19, marks a crucial developmental phase characterized by significant physical, biological, emotional, social, and cognitive changes. These rapid developments necessitate optimal iron intake, both in quantity and quality, to support their burgeoning needs (Rahayu et al., 2023; Unicef, 2021). Unfortunately, nutritional issues, particularly micronutrient deficiencies, remain a substantial public health challenge in Indonesia. Anemia, defined as sub-normal hemoglobin (Hb) levels due to insufficient red blood cells or low Hb content, is a prevalent concern among adolescents, with female adolescents being particularly vulnerable (Kemenkes RI, 2023; Lestari et al., 2022). Globally, over 30% of the population suffers from anemia, with a staggering 40-88% prevalence in developing nations, including Indonesia, where the issue persists as a major health problem (WHO, 2023; Sari et al., 2021).

The high prevalence of anemia among female adolescents is concerning, as evidenced by national data indicating that approximately 25% of adolescent girls in Indonesia are anemic (Unicef, 2021). This is consistent with a 2017 Riskesdas report showing an overall anemia prevalence of 21.7% in Indonesia, with 26.4% among children aged 5-15 and 18.4% among young adults aged 15-24 (Levimah et al., 2024). Alarmingly, female adolescents face a tenfold higher risk of anemia compared to their male counterparts (Indriani et al., 2022). Several factors contribute to this increased vulnerability, including monthly menstruation, which leads to significant blood loss and a threefold higher iron requirement for girls. Additionally, strict dieting for weight management, inadequate nutritional intake during rapid growth spurts, and poor lifestyle habits such as insufficient sleep and skipping breakfast exacerbate the problem

(Utami et al., 2021; Lestari & Puspitasari, 2024). These factors collectively underscore the urgent need for effective interventions to address anemia in this population.

While pharmacological interventions like iron supplements are available for anemia prevention, non-pharmacological approaches, such as consuming dates, offer a promising alternative (Utami et al., 2021). Dates (Phoenix dactylifera) are widely recognized for their rich nutritional profile, particularly their high content of iron and calcium, both vital for blood formation and bone marrow health (Indriani et al., 2022). Previous studies have consistently demonstrated the efficacy of date consumption in increasing hemoglobin levels. For instance, research by Rahayu & Prabasari (2024) found a significant increase in hemoglobin among female adolescents after date consumption. Similarly, Levimah et al. (2024) reported a 0.56% increase in hemoglobin levels in an intervention group receiving 100 grams of dates daily for seven days. These findings, along with others (Mufidah et al., 2024; Utami et al., 2024), highlight dates as a potent natural remedy for anemia.

This study aims to investigate the influence of date consumption on increasing hemoglobin levels in female adolescents at SMA Negeri 2 Rambah Hilir. The urgency of this research stems from the observed prevalence of anemia symptoms, such as dizziness, blurred vision, fatigue, and lack of focus, among students at this school, as revealed by preliminary findings. By demonstrating the effectiveness of dates, this study contributes to a non-pharmacological, accessible, and potentially more sustainable solution for anemia prevention and management in adolescent girls. The novelty of this research lies in its specific focus on the identified school population, providing localized evidence that can inform school health programs and empower adolescents to make healthier dietary choices, thereby reducing reliance on pharmaceutical interventions.

RESEARCH METHODS

Type and Design of Research

This study employed a quantitative research approach to investigate the influence of date consumption on hemoglobin levels in female adolescents at SMA Negeri 2 Rambah Hilir. Quantitative research is suitable for examining relationships between variables and testing hypotheses through numerical data analysis (Sugiyono, 2023; Creswell & Creswell, 2022). Specifically, a pre-experimental research design with a One-Group Pretest-Posttest approach was utilized. This design involves measuring the dependent variable (hemoglobin levels) before an intervention (pretest) and again after the intervention (posttest) in the same group of participants (Fitria et al., 2022; Sudaryono, 2024). While providing valuable insights into the effect of an intervention, this design acknowledges its limitations in controlling for all extraneous variables, offering a practical framework for initial investigations into the effectiveness of a particular intervention.

Population and Sample

The population for this study comprised all female adolescents in class X at SMA Negeri 2 Rambah Hilir who exhibited symptoms of anemia, totaling 25 individuals. Given the relatively small and accessible population, a saturated sampling technique (non-probability sampling) was employed, meaning all 25 individuals meeting the criteria were included as the sample (Periadana & Sunarsi, 2021; Emzir, 2023). This approach is often used when the population is small and homogeneous, ensuring that every eligible member participates in the study, thereby maximizing the representativeness of the sample within the defined population (Sugiyono, 2023). The selection criteria ensured that the participants were female adolescents at the specified school displaying symptoms indicative of anemia.

Instruments and Data Analysis Techniques

Data collection in this study relied on several instruments. These included an informed consent form to ensure voluntary participation and ethical considerations, an Easy Touch GCHb device for measuring hemoglobin levels, test strips for hemoglobin measurement, and the dates (kurma) themselves as the intervention material. Additionally, an observation sheet was used to

record relevant data during the study period (Hadiati & Pk, 2023). The variables under investigation were the independent variable, which was the administration of dates, and the dependent variable, which was the change in hemoglobin levels.

For data analysis, both univariate and bivariate analyses were conducted using the Statistical Package for the Social Sciences (SPSS) software. Univariate analysis was performed to describe the average distribution of hemoglobin levels before and after date administration among the female adolescents. This provides a foundational understanding of the central tendency and variability of the data (Dylanesia, 2023). Subsequently, bivariate analysis was applied to determine the significant relationship between date administration (independent variable) and changes in hemoglobin levels (dependent variable). Specifically, the Dependent T-test was chosen to compare the mean hemoglobin levels from the pretest and posttest measurements within the same group, assessing the statistical significance of any observed differences (Handayani et al., 2024; Rosita et al., 2019). This statistical test is appropriate for paired samples, allowing for a direct comparison of the participants' hemoglobin levels before and after the intervention.

Research Procedures

The research was meticulously conducted over a period from November 5, 2024, to November 13, 2024. The procedure commenced with obtaining informed consent from all 25 eligible female adolescents in class X at SMA Negeri 2 Rambah Hilir. Following consent, a pretest was administered to measure the initial hemoglobin levels of all participants using the Easy Touch GCHb device and test strips. This baseline measurement was crucial for comparing subsequent changes. After the pretest, the intervention phase began, where participants were provided with dates for a continuous period of seven days. Each participant was instructed on how to consume the dates as per the study protocol. Throughout this period, adherence to date consumption was monitored, and five participants unfortunately did not consume the dates as required, resulting in a final sample of 20 participants for the analysis. Upon completion of the seven-day intervention, a posttest was conducted to measure the hemoglobin levels of the 20 compliant participants again. The collected pretest and posttest data were then compiled and entered into SPSS for comprehensive statistical analysis, as outlined in the data analysis section (Fitria et al., 2022).

RESULTS OF RESEARCH AND DISCUSSION

RESULTS

Based on the research titled The Effect of Giving Dates on Increasing Hemoglobin Levels in Adolescent Girls at SMA Negeri 2 Rambah Hilir, has been carried out from November 5, 2024, to November 13, 2024. Based on the results of research that has been carried out on 25 populations, 25 samples were obtained. But after being given dates, only 20 people consumed dates, and 5 people did not consume dates.

1. **Univariate Analysis**

   A. **Average Hemoglobin Levels Before Giving Dates To Adolescent Girls At SMA Negeri 2 Rambah Hilir.**

Table 1. Average Distribution of Hemoglobin Levels of Adolescent Girls Before Date Feeding (n = 20)

	Average	Std. Deviation	Std. Error mean	Min-Max

Hb rate before date administration	10,01	9,59	2,14	8,10-11,50

Based on table 1 above, it is known that the average hemoglobin level of respondents before the administration of dates was 10.01 gr/dl with a standard deviation of 9.59 gr/dl and a standard error of 2.14 The minimum value was 8.10 gr/dl and the maximum value was 11.50 gr/dl.

B. Average Hemoglobin Levels After Date Feeding In Adolescent Girls At SMA Negeri 2 Rambah Hilir

Table 2. Average Distribution Of Hemoglobin Levels Of Adolescent Girls After Date Administration

Variable	Average	Std. Deviation	Std. Error mean	Min-Max
Hb rate aftre date administration	12,80	1,54	3,44	10,13-17,20

Based on table 2 above, it is known that the average hemoglobin level of respondents after giving dates is 12.80 gr/dl with a standard deviation of 1.54 and a standard error of 3.44 The minimum value is 10.13 gr/dl and the maximum value is 17.20 gr/dl.

2. Bivariate Analysis

Bivariate analysis in this study was carried out to determine the effect of dates on increasing hemoglobin levels in adolescent girls at SMA Negeri 2 Rambah Hilir

Table 3. Results of Differences in Average Hemoglobin Levels of Adolescent Girls at SMA Negeri 2 Rambah Hilir

Variable	Average Difference	SD Difference	P Value
Hemoglobin levels before and after	-2,79	2,02	0.000

Based on table 3, it can be seen that the average hemoglobin level in adolescent girls before and after being given dates is -2.79 with a standard deviation of 2.02 with *the T Dependent* test obtained *p value* = 0.000 < 0.05. This result shows that H0 is rejected and Ha fails to be rejected. So it can be concluded that there is an effect of giving dates on increasing hemoglobin levels in adolescent girls at SMA Negeri 2 Rambah Hilir.

DISCUSSION

This study aimed to investigate the effect of date consumption on hemoglobin levels among female adolescents at SMA Negeri 2 Rambah Hilir. The findings demonstrate a notable improvement in hemoglobin levels following a 7-day intervention. Before date administration, the average hemoglobin level was 10.01 gr/dL, ranging from 8.10 gr/dL to 11.50 gr/dL. Post-intervention, the average hemoglobin significantly increased to 12.80 gr/dL, with a range of 10.13 gr/dL to 17.20 gr/dL. The statistical analysis using the Dependent T-test yielded a p-value of 0.000 ($p < 0.05$), indicating a statistically significant influence of date consumption on increasing hemoglobin levels in the study participants. This rejection of the null hypothesis confirms the positive impact of the intervention.

The observed increase in hemoglobin levels is consistent with theoretical frameworks regarding nutritional factors in anemia. Anemia in adolescent girls is primarily attributed to two main factors: nutritional deficiencies, specifically inadequate intake of protein, vitamins, and minerals (especially iron), and non-nutritional factors like infections (Dieny et al., 2021; Lestari & Puspitasari, 2024). Dates, being rich in iron, play a crucial role in preventing anemia by promoting the formation of red blood cells and increasing hemoglobin concentration. Anemia, at its core, results from insufficient red blood cells or hemoglobin, which are essential for oxygen transport throughout the body (Kemenkes RI, 2023).

The mechanism by which dates enhance hemoglobin levels is rooted in their nutritional composition. The iron from dates is absorbed in the intestines and subsequently transported to the red bone marrow. Here, it binds with globin protein, under the facilitation of proteins like transferrin, to form hemoglobin. Additionally, vitamins such as B6 and C, also present in dates, are vital in reducing iron to a more absorbable form, thus improving its bioavailability and utilization for hemoglobin synthesis (Kusumawardani et al., 2020; Permatasari & Ningsih, 2022). Furthermore, dates contain potassium and riboflavin, which also contribute to red blood cell formation and overall nutritional well-being, especially during periods of high iron demand like growth spurts and menstruation in adolescent girls (Rahayu & Wahyu, 2021; Sari et al., 2021). The natural sweetness and ease of consumption also make dates a palatable and practical intervention for this age group.

These findings align strongly with several previous studies. Rahayu & Prabasari (2024) reported a significant impact of date consumption on increasing hemoglobin levels in female adolescents at MTs Negeri 5 Sragen. Similarly, Mufidah et al. (2024) found a higher average increase in hemoglobin in an intervention group consuming dates compared to a control group among female adolescents at Universitas Muhammadiyah Pringsewu Lampung, with a significant p-value of 0.000. Further corroborating these results, Utami et al. (2024) demonstrated a significant effect of date fruit on hemoglobin increase in adolescents at SMP Nahdatul Ulama Megamendung Bogor (p-value = 0.001). Levimah et al. (2024) also observed an increase in hemoglobin levels in an intervention group receiving dates for seven days among female adolescents at SMAN 2 Rejang Lebong. Finally, Handayani et al. (2024) concluded that date administration was effective in increasing hemoglobin levels in female adolescents at SMAN 1 Pagaran Tapah Kabupaten Rokan Hulu (p-value = 0.000), showing an average increase of 1.4567 gr/dL. The consistent improvements across these studies, including the present one, suggest that the 7-day duration of date consumption was sufficient to elicit a positive response in hemoglobin levels for most participants, likely due to dates' rich content of iron and calcium, crucial for blood and bone marrow formation.

In conclusion, the collective evidence from this study and related literature supports the significant role of date consumption in enhancing hemoglobin levels among female adolescents. This underscores the potential of dates as a viable and effective non-pharmacological intervention for preventing and managing anemia in this vulnerable population

CONCLUSION

This study successfully demonstrated that date consumption significantly increases hemoglobin levels in female adolescents at SMA Negeri 2 Rambah Hilir, with a statistically significant p-value of 0.000. The average hemoglobin level rose from 10.01 gr/dL before the intervention to 12.80 gr/dL afterward, supporting the efficacy of dates as a non-pharmacological approach to address anemia in this population. However, it is important to acknowledge certain limitations, particularly the one-group pretest-posttest design, which, while practical, does not include a control group. This absence means the study cannot definitively rule out other factors that might have contributed to the observed increase in hemoglobin levels, such as the Hawthorne effect or natural fluctuations in health status, or concurrent dietary changes not accounted for. For future research, it is strongly recommended to incorporate a randomized controlled trial (RCT) design to provide more robust evidence of causality. Additionally, exploring optimal dosage and duration of date consumption, investigating the long-term sustainability of these effects, and assessing the cost-effectiveness of dates compared to conventional iron

supplementation would be valuable avenues for further inquiry. Future studies could also delve into the specific types of dates and their varying nutrient profiles, as well as the cultural acceptability and adherence to date consumption in different settings, to develop more tailored and impactful public health interventions.

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