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The Effect of Date Fruit Consumption on Hemoglobin Levels among Adolescent Girls

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Abstract

Anemia is a common health problem among adolescent girls, primarily caused by menstruation and insufficient iron intake. One potential non-pharmacological intervention to increase hemoglobin levels is the consumption of date fruits (Phoenix dactylifera), which are rich in iron, vitamins, and other essential minerals. This study aims to determine the effect of date fruit consumption on hemoglobin levels among female adolescents at SMK Negeri 2 Kepenuhan, Rokan Hulu Regency. This research used a quantitative method with a pre-experimental design, specifically a one group pre-test and post-test. The sample consisted of 60 female students with hemoglobin levels below 12 g/dL who were not menstruating during the intervention. The intervention involved giving 7 dates daily for 5 consecutive days. Hemoglobin levels were measured before and after the intervention using the Easy Touch GCHb device. The results showed an increase in the average hemoglobin level from 10.87 g/dL before the intervention to 13.36 g/dL after the intervention. A paired t-test statistical analysis revealed a p-value of 0.001 ($p < 0.05$), indicating a significant difference between the pre- and post-intervention measurements. These findings suggest that regular consumption of date fruits can effectively raise hemoglobin levels. In conclusion, the consumption of date fruits has a significant effect on increasing hemoglobin levels in adolescent girls and can serve as a natural alternative for preventing anemia. This research is expected to provide a reference for developing school-based nutrition improvement programs, particularly in efforts to prevent anemia among adolescents.

Keywords*: Iron Deficiency Anemia, Phoenix dactylifera ,School-based Nutrition Intervention*

INTRODUCTION

Adolescence is a time when an individual develops from the time he first shows his secondary sexual signs to the moment he reaches sexual maturity. Individuals experience psychological development and identification patterns from childhood to adults, as well as a transition from full socioeconomic dependence to a relatively independent state. (Hikmandayani et al. 2023).

Adolescence is a transitional period, when an individual grows from childhood to an individual who has maturity. During this period, there are two important things that cause adolescents to exercise self-control. These two things are, first, external things, namely, environmental changes. And the second is an internal thing, namely the characteristics in adolescents that make adolescents relatively more volatile compared to other developmental periods *(storm and stress periods),* so that adolescents experience menstruation and besides that adolescence is a period that is still monitored under the nutritional care of parents so that their nutrition is still under the care of their parents, In addition, one of the nutritional problems that often occur in teenagers is anemia. (Hikmandayani et al. 2023).

Lack of hemoglobin levels is often also called anemia and can affect nutritional disorders when the number of red blood cells or the concentration of oxygen carriers in the blood, hemoglobin is less than normal so it is insufficient for the body's physiological needs, anemia in adolescents apart from a hundred nutrients is also due to menstruation every month, it is said to be anemia in adolescents when hemoglobin levels are less than 12 g/dL. (Chasanah, Basuki, and Dewi 2019)

The distribution of health survey data. Anemia is still a public health problem in Indonesia that needs special attention. According to the Riskesdas 2013 data, anemia in women (23.9%) is relatively higher in men (18.4%), and anemia in rural areas (22.8%) is higher than in urban areas (20.6%). There are 26.4% of children aged 5-14 years and 18.4% of 15-24 year olds have anemia. This means that in Indonesia, around 1 in 5 adolescents are suffering from anemia % Women have the highest risk of

developing anaemia, especially in adolescent girls. Various efforts have been made by the government to prevent and overcome the problem of anemia throughout Indonesia, both in adolescents, pregnant women and postpartum mothers, including the provision of Fe tablets to adolescents, pregnant women and postpartum mothers and the Communication, Information, and Education (KIE) program even though the implementation and results are still not effective. Based on the description above, researchers are interested in conducting research with non-pharmacological therapy using dates to increase hemoglobin levels without any side effects and without cause side effects or adverse effects to adolescent girls. (Ministry of Health of the Republic of Indonesia 2021)

The impact of anemia on adolescent girls is one of them is impaired growth and development, fatigue, increased susceptibility to several infections due to a decreased immune system, decreased function and immunity, more susceptibility to poisoning and impaired cognitive function. Efforts to overcome and increase Hemoglobin Levels are to consume foods rich in iron such as liver, red meat, shrimp, tofu, spinach, almonds, and one of them is dates. Hemoglobin levels can be improved by consuming foods that contain a lot of vitamin C to increase haemoglobin levels. (Kusmiran, 2016).

Date *(Phoenix dactylifera)* is a fruit that grows distinctively in desert areas. The potential of dates in the health sector has been known for a long time. The content of various minerals and vitamins in dates is believed to have the potential to be anti-cancer, anti-inflammatory, analgesic, and to play a role in kidney and liver protection. Minerals contained in dates include Zinc, Phosphorus, Calcium, Iron, Magnesium and Flourine (Utami and Graharti, 2017).

The nutritional value of the benefits of dates or *Phoenix dactylifera. L* has long been claimed for human consumption and health. Residents in the Sahara Desert area consider dates to be very rich in benefits, so the local residents consider dates as a very important food for them. The softness of the sweet flesh of dates makes dates a fruit that is rich in energy sources. 80% of the content of dates explains their high energy value. In addition, dates also contain various antioxidant compounds. The nutritional value and benefits of dates, or *Phoenix dactylifera L,* have long been claimed for human consumption and health. Residents in the Sahara Desert area consider dates to be very rich in benefits, so the local residents consider dates as a very important food for them. The softness of the sweet flesh of dates makes dates a fruit that is rich in energy sources. 80% of the content of dates explains their high energy value. In addition, dates also contain various antioxidant compounds. (Bentrad and Hamida-Ferhat, 2020)

Dates also contain sucrose, fructose, and natural glucose. Tannins in dates are anti-infectious and anti-inflammatory, calcium in dates is very important for tooth growth, while iron and potassium content are needed to neutralise body fluids when in acidic conditions (Praptiwi and Arti, 2017)

From the results of the researcher's observations, at the State Vocational High School 2 Kefullan, in observation for several days, it turned out that there were still many young women who experienced anemia or also called red blood cell deficiency, at the time of the examination results of 60 adolescent girls and found several adolescents who experienced anemia. This anemia can cause discomfort, drowsiness, weakness, fatigue, lethargy, and even a lack of focus of adolescents in carrying out learning that takes place if this anemia is not handled properly. Therefore, the researcher is interested in giving dates to adolescent girls to reduce the occurrence of anemia in adolescent girls at SMK Negeri 2 Kefullan where the giving of dates is given in the morning and is done before breakfast, in giving dates as long as adolescents are not menstruating, this giving time lasts for 5 days as many as 7 dates at the school.

The primary aim of this research is to evaluate the effect of date fruit (Phoenix dactylifera) consumption on increasing hemoglobin levels among adolescent girls at SMK Negeri 2 Kepenuhan, Rokan Hulu. The urgency of this study stems from the high prevalence of anemia among teenage girls, which can impair their growth, cognitive development, and overall health, making it crucial to find accessible, natural, and effective nutritional interventions. The novelty of this research lies in its focus on a culturally familiar and easily obtainable natural food—dates—as a means to combat anemia non-pharmacologically, providing an alternative approach that can be integrated into school health programs. Unlike previous studies that often emphasize supplementation or medication, this study explores the potential of dietary modification through the daily intake of dates, highlighting both its practicality and sustainability in addressing nutritional deficiencies among adolescents.

RESEARCH METHODS

This study employed a quantitative research design with a pre-experimental approach, specifically a one-group pre-test and post-test design, aimed at systematically investigating the effect of date fruit (Phoenix dactylifera) consumption on hemoglobin levels among adolescent girls at SMK Negeri 2 Kepenuhan (Priadana & Sunarsi, 2021). The population consisted of all female students in grades X and XI at the school, totaling 60 students. The sample was selected based on specific inclusion criteria, namely students with hemoglobin levels below 12 g/dL who were not menstruating during the intervention period, and all students fitting these criteria were included, employing a total sampling method to ensure comprehensive data collection. Hemoglobin levels were measured using the Easy Touch GCHb device, a portable and accurate tool suitable for non-invasive assessments (Kemenkes RI, 2021). The data collection involved two phases: initial pre-intervention measurements and follow-up post-intervention assessments. During the intervention, each participant received 7 dates daily for 5 consecutive days, taken in the morning before breakfast and outside of menstrual periods to minimize confounding variables. After completing the intervention, hemoglobin levels were re-measured to determine any changes attributable to the date intake. The collected data were analyzed using descriptive statistics—calculating means, standard deviations, and ranges—and paired t-tests were performed to evaluate the significance of differences between pre- and post-intervention hemoglobin levels, with a significance level set at $p < 0.05$ (Priadana & Sunarsi, 2021). The statistical analysis provided insights into whether the observed changes were significant, thereby testing the hypothesis that date consumption could effectively increase hemoglobin levels among adolescent girls. The entire research process involved ethical approval, participant selection, initial measurements, intervention implementation, follow-up measurements, and data analysis, culminating in conclusions about the efficacy of this natural, non-pharmacological intervention

Prior to initiating the study, the researchers obtained ethical clearance from the relevant institutional review board to ensure the protection of participants' rights and well-being. This process involved submitting a comprehensive research proposal outlining the study's objectives, methodology, and measures to safeguard participant safety. Informed consent was diligently secured from all adolescent girls involved, with clear explanations provided regarding the purpose of the study, procedures, potential risks, and benefits. Special attention was given to ensure that participation was voluntary, and participants were assured of the confidentiality of their data. Additionally, the study adhered to ethical guidelines by selecting non-invasive measurement tools, such as the Easy Touch GCHb device, and by scheduling assessments outside of menstrual periods to minimize discomfort and confounding factors. The researchers maintained transparency throughout the process, respecting the autonomy of each participant and ensuring that the research complied with ethical standards aimed at protecting vulnerable populations like adolescents..

RESULTS AND DISCUSSION

Based on the results of research that has been done by researchers about the influence with the number of respondents 60 female teenagers in class X and XI at SMK Negeri 2 Kepenuhan with Univariate analysis obtained results.

Univariate Analysis

1. **Hemoglobin levels of adolescent girls in class X and XI SMK Negeri 2 Kepenuhan**

Table 1.Average Hemoglobin Levels in Adolescent Girls in Class X and XI Before being given dates at SMK Negeri 2 Kepenuhan

Variable	Mean	SD	Min-Max
Before being given dates	10,87	1,25	7,8 - 11,9

The table presents the average hemoglobin levels among adolescent girls in grades X and XI at SMK Negeri 2 Kepenuhan before the intervention of date

consumption. The mean hemoglobin level was 10.87 g/dL, with a standard deviation of 1.25 g/dL, indicating some variability in the data. The range of hemoglobin levels among the participants was from a minimum of 7.8 g/dL to a maximum of 11.9 g/dL. These results suggest that, before the intervention, most of the adolescent girls had hemoglobin levels below the normal cutoff point of 12 g/dL, which confirms the prevalence of anemia within this group.

Table 2. Average Hemoglobin Level in Adolescent Girls in class X and XI after being given dates at SMK Negeri 2 Kepenuhan.

Variabel	Mean	SD	Min-Max
After giving dates	13,36	0,73	12,5 – 14,6

The table displays the average hemoglobin levels among adolescent girls in grades X and XI at SMK Negeri 2 Kepenuhan following the period of date consumption. The mean hemoglobin level increased to 13.36 g/dL, with a standard deviation of 0.73 g/dL, indicating a more consistent response among the participants. The range of hemoglobin levels after the intervention was from 12.5 g/dL to 14.6 g/dL. This significant increase suggests that the daily intake of dates had a positive effect on the hemoglobin levels of the adolescent girls, moving many of them toward or above the normal threshold of 12 g/dL.

Bivariate Analysis

1. **Relationship Between Giving Before and After Giving Dates**

Table 3. Effect of Dates on Hemoglobin Level of Adolescent Girls at SMK Negeri 2 Kepenuhan, Rokan Hulu Regency

Variable	Mean	SD	SE	P *value*
Before given dates				
	-2,49	1,64	0,52	0,001
After given dates				

The bivariate analysis examines the effect of date consumption on the hemoglobin levels of adolescent girls at SMK Negeri 2 Kepenuhan. The results show a significant increase in hemoglobin levels after the intervention. Specifically, the mean difference between the pre- and post-intervention hemoglobin levels is -2.49 g/dL, with a standard deviation of 1.64 and a standard error of 0.52. The p-value associated with this change is 0.001, indicating that the improvement in hemoglobin levels after giving dates is statistically significant. This suggests that

the daily consumption of dates positively influences hemoglobin levels among the adolescent girls in this study.

Discussion

Adolescence is a critical developmental period characterized by profound physical, psychological, and social changes. According to Hikmandayani et al. (2023), this phase begins when individuals first exhibit secondary sexual characteristics and continues until they reach sexual maturity. During this time, adolescents undergo significant psychological development and identity formation, transitioning from childhood to adulthood. This period also involves a shift from complete dependence on parental support to relative independence. External factors, such as environmental changes, influence adolescents' behavior and development, while internal factors—such as emotional fluctuations and hormonal changes—contribute to what is often described as a "storm and stress" period. This tumultuous phase can lead to increased vulnerability to health issues, including nutritional deficiencies like anemia. Furthermore, adolescents are still under the influence of parental guidance, especially regarding nutrition, which sometimes results in inadequate dietary intake, making them susceptible to nutritional problems such as iron deficiency anemia (Hikmandayani et al., 2023).

Within this context, anemia remains a prevalent concern among adolescent girls, largely due to menstruation, poor dietary habits, and insufficient iron intake. Anemia, defined as a hemoglobin level below 12 g/dL in adolescent females, can impair physical growth, cognitive function, and immune response, ultimately affecting their overall health and development (Chasanah, Basuki, & Dewi, 2019). The vulnerability of adolescent girls to anemia emphasizes the importance of nutritional interventions tailored to this age group, especially considering their unique physiological and psychological needs during this transitional phase.

The findings of this study reveal a significant improvement in hemoglobin levels among adolescent girls after a nutritional intervention involving date fruit (kurma) consumption. Specifically, in a sample of 60 female students from SMK Negeri 2 Kepenuhan, the average hemoglobin level increased from 10.87 g/dL before the intervention to 13.35 g/dL after the intervention. This substantial rise indicates that the intake of kurma, which is naturally rich in iron, vitamins, and other essential minerals, can effectively enhance hemoglobin synthesis and address iron deficiency. The increase in hemoglobin levels was statistically validated using a paired t-test, which yielded a p-value of 0.001. Since this p-value is less than the conventional significance level of 0.05, it confirms that the observed difference is statistically significant and not due to chance.

This significant improvement underscores the potential of natural, culturally acceptable dietary sources such as kurma as a feasible and sustainable strategy to combat anemia among adolescent girls. Kurma contains a high concentration of bioavailable iron, along with vitamin C, which facilitates iron absorption, thus providing a synergistic effect for increasing hemoglobin levels. The findings align with previous research indicating that regular consumption of dates can positively influence hematological parameters and overall nutritional status (Utami & Graharti, 2017). Moreover, incorporating kurma into adolescent diets can serve as an accessible, cost-effective, and culturally appropriate intervention, especially in regions where date fruits are readily available.

In conclusion, the results demonstrate that kurma has a significant positive impact on hemoglobin levels in adolescent girls. This intervention could be integrated into school health programs and nutritional policies aimed at preventing and reducing anemia prevalence in this vulnerable population. Implementing such natural dietary strategies may not only improve hematological health but also contribute to better growth, development, and academic performance among adolescents. Therefore, promoting the consumption of kurma can be a vital component of a comprehensive approach to adolescent health and nutrition.

CONCLUSION

This study demonstrated that the administration of date fruit (kurma) significantly increased hemoglobin levels among adolescent girls at SMK Negeri 2 Kepenuhan. The average hemoglobin level rose from 10.87 g/dL before the intervention to 13.36 g/dL after five days of daily kurma consumption, with statistical analysis confirming the significance of this increase ($p = 0.001$). These findings suggest that kurma, as a natural and culturally accepted food source rich in iron, vitamins, and minerals, can serve as an effective alternative approach to prevent and manage anemia in adolescent females. However, the study has certain limitations, including the short duration of the intervention and the focus on a specific population, which may affect the generalizability of the results. Future research should explore the long-term effects of regular kurma consumption, include larger and more diverse samples, and compare its efficacy with other nutritional interventions. Additionally, investigating the impact of combining kurma intake with other dietary improvements or supplementation could further enhance strategies to combat anemia effectively among adolescents.

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