

Review Paper

Effect of Date Consumption on Prevention of Anemia in Children and Adolescents: A Review

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ABSTRACT

Background: Iron deficiency (ID) anemia is a global health concern, impairing growth, cognitive development, and immunity in children and adolescents. While iron supplementation is standard, adherence to its use is limited due to side effects such as gastrointestinal discomfort and unpalatable taste. The date fruit (*Phoenix dactylifera* L.) is a nutrient-rich food, containing iron, vitamin C, antioxidants, and other compounds, offering a culturally acceptable alternative.

Objectives: This study aims to review current studies on the advantages and disadvantages of date intake.

Methods: This is a narrative review. The search for related studies was conducted in PubMed, Scopus, Web of Science, and Google Scholar using keywords "date fruit," "anemia," "children," "iron," and "*Phoenix dactylifera*." The controlled studies (e.g. RCTs, cohort studies) in children and adolescents were included. Quality assessment was performed using the Newcastle-Ottawa scale (NOS).

Results: From the 120 articles identified by the initial search, 9 eligible studies were ultimately selected. These studies (with a total number of 227 participants, aged 8-18 years) demonstrated that daily date consumption (50-100 g/day for 1-8 weeks) significantly increased hemoglobin levels, with a mean change of 1.16 g/dL (range: 0.24-2.29 g/dL; $P < 0.05$ in most studies). Dates offered a natural and tolerable intervention for anemia management, particularly in regions where dates are more culturally accepted. Cultural and geographical factors, such as date accessibility in Middle Eastern vs non-endemic regions, warrant further exploration.

Conclusions: Date consumption is a promising nutritional strategy for anemia prevention in pediatric populations. However, further large-scale, longer follow-up RCTs are needed for confirmation. Policymakers are recommended to integrate date fruit consumption into health programs for children with anemia.

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Introduction

Anemia, defined by a shortage of red blood cells or hemoglobin, impacts a large portion of the global child population [1, 2]. It harms both bodily and intellectual progress, leading to poorer academic results, weakened immune systems, and greater vulnerability to diseases [1]. Tackling nutrient deficiencies, especially those involving iron, is essential for preventing and managing anemia [1]. Iron is a key nutrient for growth, brain function, and general well-being in kids. Iron deficiency (ID) is one of the most common nutritional problems worldwide and is a primary trigger for anemia in children under five years old. The negative effects of ID include hindered mental and motor skills, lowered immunity, and higher infection risks. To combat ID, iron supplements are frequently administered, particularly for those with inadequate food-based intake. Iron is crucial for creating hemoglobin, carrying oxygen, and generating energy. Proper iron levels are especially important during rapid growth phases, such as infancy and the toddler years, when needs for iron increase sharply. Research indicates that iron supplements can increase hemoglobin levels, reduce anemia rates, and improve brain function in children with ID [1, 2]. The [World Health Organization \(WHO\)](#) also supports iron supplements for high-risk groups, such as young kids in developing countries [3].

Despite their advantages, iron supplements come with various downsides that can hinder their consistent use, including stomach-related problems (such as queasiness, vomiting, hard stools, loose bowels) and abdominal pain. These issues often depend on dosage and are more noticeable in pill forms of iron [4]. While the [WHO](#) recommends iron supplements to treat ID in children, they are associated with side effects such as constipation and gastrointestinal discomfort [4]. Studies have also reported negative outcomes, such as developmental issues in children resulting from excessive iron intake [5]. Moreover, the flavor of these supplements may not be attractive to children. Due to these challenges, natural options have been recommended as alternatives to synthetic iron supplements.

The widespread occurrence of anemia worldwide highlights the importance of dietary solutions [6]. Foods like date fruit, popular in numerous areas, contain abundant nutrients such as iron and have long been valued for their health benefits, as illustrated in [Figure 1](#). Dates play a crucial role in balanced eating due to their rich content of vitamins (particularly vitamin B), tannins, crude fiber, and plant compounds that offer antioxidant

benefits and can help prevent illnesses [6, 7]. Dates have a high sugar content, accounting for 50-88% of their total weight, depending on the cultivar type, ripening stage, and moisture content. Their pulp mainly consists of sugars, such as fructose and glucose, which account for about two-thirds of its total flesh, with water making up one-fifth, and a small portion of dietary fiber. Their substantial sugar makes them a great energy provider for people [8]. However, determining how well date intake truly prevents or treats anemia in youth needs a thorough evaluation of scientific data. This study aims to review current studies on the advantages and disadvantages of date intake.

Methods

This is a review study. We searched several online databases, including [PubMed](#), [Scopus](#), [Web of Science](#), and [Google Scholar](#), to identify pertinent studies published in peer-reviewed journals, utilizing keywords such as “date fruit,” “anemia,” “children,” “iron,” “nutritional intervention,” and “*Phoenix dactylifera*.” The studies published in English and focused on human subjects were searched. The studies investigated the effect of date fruit consumption on anemia in children; those that utilized a controlled study design (e.g. randomized controlled trials, cohort studies, case-control studies), and those that reported relevant hematological parameters (e.g. hemoglobin levels, hematocrit, red blood cell count) were included. The studies that focused on adults, gray literature, studies unrelated to anemia or hematological parameters, and those lacking sufficient data on date consumption were excluded. The quality of studies was assessed using the Newcastle-Ottawa scale (NOS). From 120 articles found by the initial search, 9 articles were deemed eligible for selection. [Figure 2](#) shows the flow-chart of the study selection process.

Relevant information was extracted from eligible studies, including study design, sample size, intervention details, key findings, and limitations. Data synthesis focused on the nutritional properties of dates, their mechanisms of action, and their impact on anemia prevention.

Results

[Table 1](#) presents the characteristics of the included studies.

Discussion

This review study highlights date fruit as an effective natural intervention for anemia in children and ado-

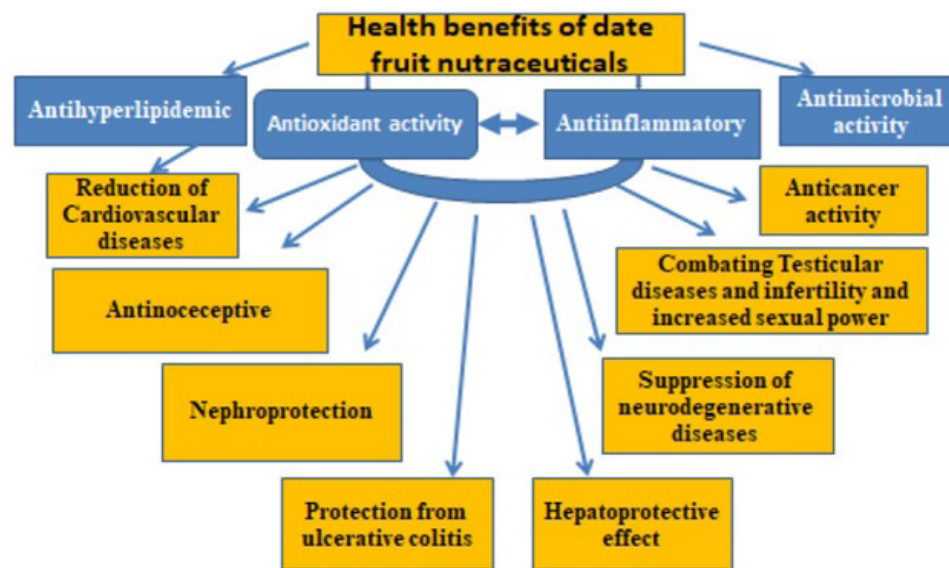


Figure 1. Health benefits of date fruit [9]

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lescents, with consistent improvements in hemoglobin levels across studies. The average increase of 1.16 g/dL aligns with clinical thresholds for resolving anemia (e.g. WHO criteria: Hb >11 g/dL in children) and surpasses some effects of supplementation alone [4]. Mechanisms of action include iron-vitamin C synergy for absorption, antioxidant protection against oxidative stress, and modulation of the gut microbiota [9, 19]. Dates performed better than iron supplements [13], possibly due to better tolerability and palatability [9]. In vulnerable groups such as adolescent girls, rapid im-

provements (e.g. 2.29 g/dL in 7 days) suggest applicability in resource-limited settings [12].

The small sample size of studies (median=25) increases the risk of type II error and limits the generalizability of the results to larger populations, which may inflate the effect size due to publication bias. The short duration of studies (median=4 weeks) prevents the assessment of long-term efficacy. For example, the initial increase in hemoglobin level might be due to short-term factors (such as temporary improvement in absorption); it

Table 1. Characteristics of the included studies

Author(s), Year	Design	Sample Size	Intervention (Dose/Duration)	Target Group	Pre-Hb (g/dL)	Post-Hb (g/dL)	ΔHb (g/dL)	NOS Score
Irandegani et al. 2019 [10]	RCT	31	50 g/day dates/4 weeks	Girls (8-10 y) with IDA	11.19	12.05	0.86	7
Heba & Ahmed 2015 [11]	Cohort	25	100 g/day black dates/8 weeks	Orphan children with anemia	11.2	11.7	0.5	6
Handayani & Kusti-yati 2023 [12]	RCT	21	Date decoction(7 dates/200 mL)/7 days	Anemic adolescents	10.81	13.10	2.29	8
Sari et al. 2018 [13]	RCT	N/A	100 g dates + Fe supplement/4 weeks	Anemic girls	N/A	N/A	> Fe alone	7
Annafi Rahayu et al. 2024 [14]	Cohort	20	50 g x 3/day/6 weeks	Anemic girls	10.22	11.85	1.63	6
Gujarathi et al. 2022 [15]	RCT	N/A	100 g/day date mixture/8 weeks	Children with IDA	N/A	Significant increase	N/A	7
Aisah et al. 2022 [16]	Cohort	30	12.5 g/kg BW/14 days	Female adolescents	10.8	11.9	1.1	6
Kusumawardani et al. 2020 [17]	Cohort	30	2 dates/day/21 days	Adolescents	12.03	12.27	0.24	5
Julaecha et al. 2023 [18]	Cohort	20	5 dates/day/7 days	Adolescents	11.15	12.65	1.5	6

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Abbreviations: N/A: Not reported; RCT: Randomized clinical trials; IDA: Iron deficiency anemia; NOS: Newcastle-Ottawa scale.

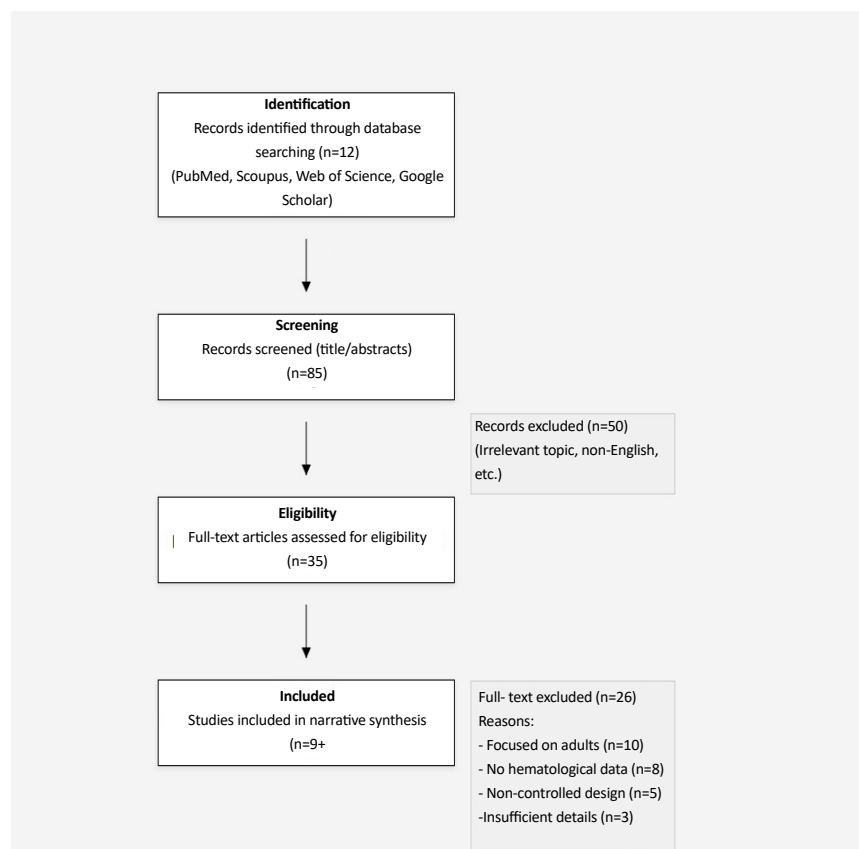


Figure 2. The flowchart of the study selection process

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cannot be confirmed whether these benefits are stable against the return of anemia. Sustained benefits may diminish without continuous consumption. These limitations can lead to an overestimation of effectiveness, especially in non-randomized designs where selection bias may occur. No studies investigated confounding factors such as diet or comorbidities.

Moreover, cultural and geographical differences in the consumption of or accessibility to dates can influence the results, but this issue has not been explored in depth. Most studies were from Middle Eastern and Asian countries (such as Iran, Indonesia, and Egypt), where dates are a part of the food culture, and easy access (due to local production) increases consumption. This could make the results appear more positive, as participants may already be familiar with dates and consume them readily. In contrast, in non-native regions such as Europe, North America, or South Africa, limited access (due to expensive imports or unfamiliarity) can reduce feasibility and lead to lower consumption. For example, in Western countries, different dietary preferences (focused on local fruits like apples or oranges) may decrease the acceptance of dates and diminish the positive effects. These differences can create a geo-

graphical bias, making the results less generalizable. Therefore, future studies should investigate culturally adapted interventions (such as incorporating dates into local dishes) to bridge these gaps. Therefore, large-scale, multi-center randomized clinical trials with larger sample sizes, longer follow-up, and cost-effectiveness analyses are recommended. Investigating the optimal dose and varieties of dates can improve the results.

Conclusion

This study suggests that dates can serve as a natural and safe source of nutrition for reducing anemia in children. The findings can guide health policymakers in promoting the use of dates as part of anemia prevention and management programs. Raising awareness among families and school children about the benefits of date consumption can play a significant role in reducing the prevalence of anemia in society.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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Authors contributions

Conceptualization and study design: Javad Sadeghinassab; Writing the original draft: Javad Sadeghinassab; Data collection, analysis, review, editing and final approval: All authors.

Conflicts of interest

The authors declared no conflict of interest.

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