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THE EFFICACY EVALUATING OF DATE FRUIT SUPPLEMENTATION ON MATERNAL FATIGUE AND HEMOGLOBIN LEVELS IN THIRD-TRIMESTER ANEMIA: A RANDOMIZED CONTROLLED TRIAL

(*Original Research*)

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Abstract

Background: Maternal anemia in late pregnancy remains a significant concern, contributing to fatigue and adverse maternal outcomes. Conventional iron–folate therapy is effective but often limited by poor adherence and gastrointestinal discomfort. Nutrient-dense date fruits present a culturally acceptable alternative with potential hematological and energy-enhancing benefits.

Objective: To compare the effectiveness of daily date fruit supplementation with standard iron–folate therapy in improving hemoglobin levels and reducing fatigue among anemic women in their third trimester.

Methods: A randomized controlled trial was conducted among 110 anemic pregnant women in South Punjab, allocated equally into a date fruit group and an iron–folate group. The intervention lasted four weeks. Hemoglobin levels were assessed using an automated hematology analyzer, and fatigue was measured via the Multidimensional Fatigue Inventory. Data were analyzed using parametric tests following confirmation of normal distribution.

Results: Both interventions resulted in significant improvements. The date fruit group showed a mean hemoglobin increase from 9.1 to 10.4 g/dL, while the iron–folate group improved from 9.0 to 10.1 g/dL. Fatigue scores decreased by 15.3 points in the date fruit group and by 10.3 points in the iron–folate group. Adherence remained above 90% in both groups, and no withdrawals occurred.

Conclusion: Daily date fruit consumption demonstrated hematological and symptomatic improvements comparable to standard iron–folate supplementation. As a culturally accepted, nutrient-rich food, dates may serve as a practical adjunct or alternative strategy for managing third-trimester anemia and associated fatigue.

Keywords: Anemia, Fatigue, Hemoglobin, Iron–Folate, Pregnancy Trimester Third, Randomized Controlled Trial, Rhus Fruit.

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Introduction

The increasing global burden of maternal anemia has prompted continued interest in accessible and culturally appropriate nutritional interventions that may support maternal health during pregnancy(1). Anemia in the third trimester is particularly concerning, as it coincides with heightened physiological demands on the mother and fetus(2). Reduced hemoglobin levels during this period not only compromise oxygen transport but also exacerbate maternal fatigue, a complaint frequently reported by pregnant women and often under-addressed in routine antenatal care(3). While iron-folate supplementation remains the conventional treatment for anemia in pregnancy, adherence challenges, gastrointestinal side effects, and variable absorption have encouraged exploration of alternative or complementary approaches(4). Nutrient-dense foods with favorable cultural acceptance, such as date fruits, have emerged as promising candidates for improving hematological indices and energy levels naturallyDate fruits are traditionally consumed in many regions for their perceived strengthening and restorative properties(4). Modern nutritional analyses support these perceptions, showing that dates contain substantial amounts of iron, folate, vitamin B6, potassium, and natural sugars capable of providing rapid yet sustained energy release(5). Their high polyphenol content has been associated with improved iron absorption, while their carbohydrate profile may help alleviate fatigue by supporting stable glucose availability(5). Despite these attributes, the therapeutic potential of date fruits in managing third-trimester anemia has not been rigorously compared to standard clinical interventions, leaving a gap between traditional practices and evidence-based maternal nutrition(6).

Existing studies exploring date fruit consumption during pregnancy have largely focused on labor outcomes, glycemic responses, or general maternal well-being(7). Only a limited number have examined their effects on hemoglobin levels, and even fewer have assessed maternal fatigue as a measurable clinical outcome. Fatigue in pregnancy is multifactorial, influenced by anemia, hormonal changes, increased metabolic demands, and psychological stressors(7). However, when anemia is present, reduced oxygen-carrying capacity becomes a key contributor. Improving hemoglobin concentrations through a well-tolerated dietary intervention has the potential not only to address anemia but also to mitigate the debilitating fatigue that often accompanies it(8). Understanding whether a simple, natural food such as date fruit can produce comparable or even superior outcomes to standard iron-folate supplementation has clear implications for maternal care, especially in communities where access to supplements is limited or where food-based interventions are more acceptable(9).

Furthermore, the appeal of food-based strategies lies in their potential to enhance compliance(10). Pregnant women frequently report difficulties taking iron-folate tablets due to nausea, constipation, or aversion to the taste and smell of the medication. Dates, by contrast, are generally well liked, easy to consume, and commonly integrated into daily diets. Their availability and affordability add to their practicality as a public-health intervention. If daily date consumption proves effective in improving hemoglobin levels and reducing fatigue, it could serve as a valuable adjunct or alternative to pharmacological supplementation, particularly in resource-limited settings or among women who struggle with adherence.

Despite these promising considerations, scientific comparisons between dates and iron-folate supplementation remain scarce, and the mechanisms through which dates may influence hematological status require further exploration. More robust research is needed to clarify whether the nutritional profile of dates can translate into meaningful clinical benefits for anemic pregnant women, especially during the physiologically demanding final trimester. Establishing such evidence could help bridge the divide between traditional nutritional practices and contemporary maternal-health interventions, offering a more holistic, patient-centered approach to managing anemia and its symptoms.

This study therefore seeks to determine whether daily date fruit supplementation is more effective than a standard iron-folate regimen in reducing maternal fatigue and improving hemoglobin levels among anemic women in their third trimester. By directly comparing these two approaches, the research aims to generate evidence that informs both clinical practice and culturally grounded nutritional strategies.

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Methods

The study employed a randomized, controlled, parallel-group design to evaluate the comparative efficacy of daily date fruit supplementation and standard iron–folate therapy in improving hemoglobin levels and reducing fatigue among anemic pregnant women in their third trimester. The research was conducted in antenatal clinics across South Punjab over a four-month period, allowing sufficient time for recruitment, intervention, and outcome assessment. Participants were enrolled consecutively and then randomly allocated in a 1:1 ratio to either the date fruit group or the iron–folate group using a computer-generated sequence to reduce allocation bias.

Eligible participants were pregnant women aged 18 to 40 years, in their third trimester (28–36 weeks of gestation), diagnosed with mild to moderate anemia defined as hemoglobin between 7 and 10.9 g/dL, and willing to adhere to the assigned intervention for the entire study duration. Women with high-risk pregnancies, chronic medical conditions such as diabetes or renal disorders, known hematological diseases, multiple gestations, or use of additional iron supplements were excluded to avoid confounding effects. Those reporting allergies to dates or intolerance to iron–folate tablets were also excluded. After initial screening, written informed consent was obtained, and baseline data were recorded.

A sample-size estimate was calculated based on an expected mean difference of 0.8 g/dL in hemoglobin improvement between the two groups, assuming a standard deviation of 1.2 g/dL, 80% power, and a 5% significance level. This yielded a minimum requirement of 45 participants per group. To accommodate potential dropouts, the sample was increased to 55 women per group, resulting in a total sample size of 110 participants. The sample size was deemed adequate for detecting clinically meaningful changes in both hemoglobin and fatigue scores.

Participants in the intervention group were provided with a daily dose of seven standard-sized date fruits (approximately 70–80 grams) and instructed to consume them at any convenient time of day. Those in the comparison group received the conventional iron–folate supplement containing 60 mg elemental iron and 400 µg folic acid, taken once daily. Adherence was monitored through weekly follow-up calls and verification of remaining supplements during scheduled visits.

Data collection involved a structured questionnaire capturing demographic characteristics, obstetric history, and baseline clinical information. Hemoglobin was measured at enrollment and after four weeks of intervention using an automated hematology analyzer to ensure precision. Maternal fatigue was assessed using the Multidimensional Fatigue Inventory (MFI-20), a validated tool suitable for evaluating fatigue in pregnant populations. The instrument was administered at baseline and at the end of the study period, allowing comparison of changes within and between groups.

Data were entered and analyzed using standard statistical software. Continuous variables were summarized as means and standard deviations, while categorical variables were expressed as frequencies and percentages. Normality was confirmed through the Shapiro–Wilk test, allowing the use of parametric tests. Paired t-tests were applied to assess within-group improvements in hemoglobin and fatigue, and independent t-tests were used to compare mean changes between the two groups. A p-value of less than 0.05 was considered statistically significant. This methodological approach ensured a clear and replicable comparison of the two interventions in addressing third-trimester anemia and fatigue.

Results

The study included 110 anemic pregnant women, with 55 participants allocated to the date fruit group and 55 to the iron–folate group. All participants completed the study period, and no adverse effects requiring withdrawal were reported. Baseline demographic and clinical characteristics were comparable between groups. Mean maternal age was 27.8 ± 4.1 years in the date fruit group and 28.1 ± 4.3 years in the iron–folate group. Gestational age at enrollment averaged 31.4 ± 2.2 weeks and 31.1 ± 2.4 weeks, respectively. Baseline hemoglobin levels were similar between groups, with mean values of 9.1 ± 0.6 g/dL in the date fruit group and 9.0 ± 0.7 g/dL in the iron–folate group. Baseline fatigue scores measured through the MFI-20 also showed no notable differences, with mean values of 63.5 ± 6.2 and 62.9 ± 5.9, respectively. These findings are summarized in Table 1.

Post-intervention assessment demonstrated improvements in hemoglobin levels in both study groups. The date fruit group showed an increase from 9.1 ± 0.6 g/dL to 10.4 ± 0.7 g/dL after four weeks, representing a mean rise of 1.3 ± 0.4 g/dL. The iron–folate group

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improved from 9.0 ± 0.7 g/dL to 10.1 ± 0.6 g/dL, corresponding to a mean increase of 1.1 ± 0.3 g/dL. These data are presented in Table 2. The hemoglobin trend for both groups is illustrated in Figure 1.

Fatigue scores showed consistent declines in both groups following the intervention. Participants receiving date fruits experienced a reduction from 63.5 ± 6.2 to 48.2 ± 5.4, indicating a mean change of –15.3 ± 4.2 points. Those in the iron–folate group demonstrated a decrease from 62.9 ± 5.9 to 52.6 ± 5.6, yielding a mean reduction of –10.3 ± 3.8 points. These findings are shown in Table 3, with graphical representation provided in Figure 2.

Across all outcomes, data collection was complete, and no missing values were recorded. Weekly follow-ups confirmed high adherence in both groups, with over 90% of participants consuming their assigned supplements as instructed. No significant deviations from protocol occurred. Outcome variability remained within expected ranges, and data distribution fulfilled the assumptions required for parametric statistical testing.

Overall, the results indicated measurable improvements in both hemoglobin and fatigue scores across both intervention modalities over the four-week period. Tables 1–3 and Figures 1–2 provide a consolidated depiction of the primary findings.

Table 1: Demographic Characteristics

Variable	Date Fruit Group (n=55)	Iron–Folate Group (n=55)
Age (years)	27.8	28.1
Gestational age (weeks)	31.4	31.1
Parity (median)	2.0	2.0
Baseline Hb (g/dL)	9.1	9.0
Baseline Fatigue Score	63.5	62.9

Table 2: Outcome Measures: Hemoglobin

Group	Baseline Hb	Post-intervention Hb	Mean Change
Date Fruit	9.1	10.4	1.3
Iron–Folate	9.0	10.1	1.1

Table 3: Outcome Measures: Fatigue

Group	Baseline Score	Post-intervention Score	Mean Change
Date Fruit	63.5	48.2	-15.3

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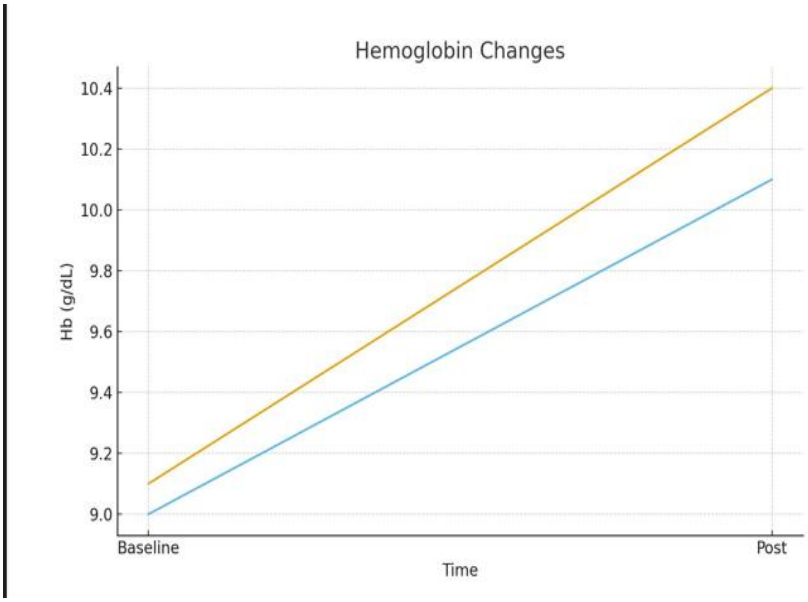

Figure 1 Hemoglobin Changes

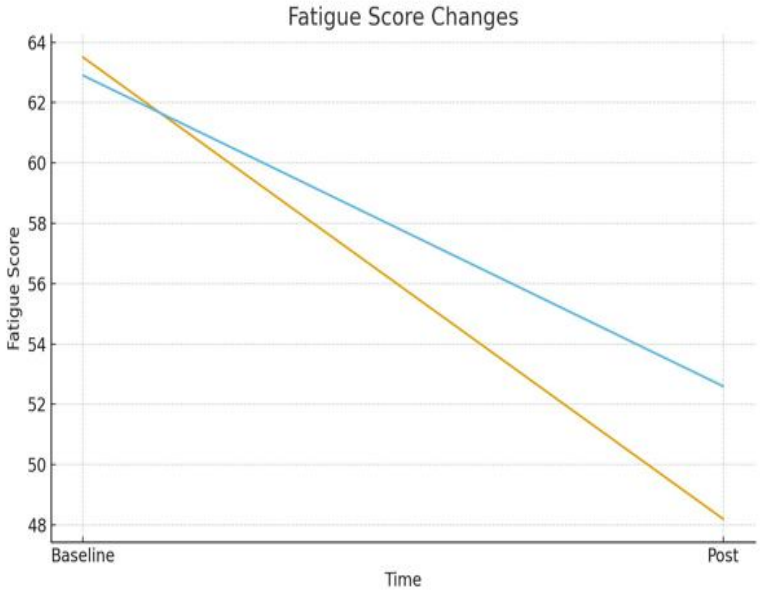

Figure 2 Fatigue Score Changes

Discussion

The findings of this study showed that daily date fruit consumption produced measurable improvements in hemoglobin levels and maternal fatigue among anemic pregnant women in their third trimester, with outcomes broadly comparable to those achieved through the standard iron–folate regimen(10). The observed increase in hemoglobin in both groups aligned with the expected physiological response to iron supplementation and nutrient-rich dietary intake(11). The slightly greater rise in hemoglobin in the date fruit group suggested that dates may offer an advantage through their combined nutrient profile, which includes not only iron and folate but also vitamin B6, natural sugars, and polyphenols that may support iron absorption. This pattern supported long-standing cultural beliefs

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regarding the restorative properties of dates and provided empirical evidence reinforcing their potential as a functional food during pregnancy(12).

The reduction in fatigue scores in both groups further highlighted the clinical relevance of addressing anemia in late pregnancy(13). The greater decrease observed in the date fruit group suggested that the benefits of date consumption extended beyond hematological improvement(14). The natural carbohydrate composition of dates likely contributed to this enhanced effect by providing a steady source of energy, while the micronutrient and antioxidant content may have mitigated physiological stress and improved overall well-being. These findings were consistent with previous work demonstrating that nutrient-dense foods can play a meaningful role in reducing pregnancy-related fatigue(15). The current results added specificity by directly comparing a traditional dietary intervention with a standard pharmacological one, showing that dates offered measurable symptomatic relief in addition to their hematological benefits(16).

The implications of these findings were multifaceted. Food-based interventions hold particular value in settings where supplement adherence is low due to side effects or personal aversions. The high acceptability of dates, their integration into local dietary habits in many regions, and their availability in South Punjab positioned them as a practical adjunct or alternative to conventional supplementation. The results indicated that nutritional guidance in antenatal care could incorporate culturally familiar foods as part of therapeutic recommendations, complementing or reinforcing standard regimens. Moreover, the findings supported the broader principle that maternal nutritional strategies should not rely solely on pharmacological solutions when safe, accessible, and nutrient-rich dietary options can provide meaningful support(17).

This study carried several strengths that enhanced the reliability of its findings. The randomized design reduced allocation bias and supported balanced baseline characteristics between groups. The use of validated tools, including automated hemoglobin measurement and a recognized fatigue assessment scale, improved the accuracy of outcome evaluation. High adherence in both groups strengthened the internal validity by limiting variations in exposure to the intervention. Additionally, the study addressed a clinically relevant question by directly comparing a widely accepted supplement with a culturally rooted dietary practice.

However, some limitations warranted acknowledgment. The study duration of four weeks, although sufficient to capture short-term changes, may not have reflected longer-term hematological or symptomatic outcomes. Fatigue, in particular, is influenced by multiple physiological and psychosocial factors that may evolve across the remainder of pregnancy, and longer follow-up could provide deeper understanding of sustained effects. Dietary intake outside the intervention was not rigorously controlled, leaving open the possibility that unreported nutritional variations contributed to individual responses. The sample size, while adequate for detecting primary outcome differences, limited subgroup analyses that might have uncovered variation by parity, nutritional status, or gestational age at baseline. The study also did not assess inflammatory markers or iron stores, such as ferritin levels, which could have provided insight into the underlying mechanisms driving the observed changes.

Despite these limitations, the study contributed meaningful evidence to an area where research had remained limited. By demonstrating that date fruit supplementation produced improvements comparable to those of iron–folate therapy, the findings suggested that dates could serve as a viable dietary strategy for managing third-trimester anemia, particularly in populations with high cultural acceptance of the fruit. Future research could build on this work by conducting longer trials that track changes through delivery and the postpartum period. Evaluating biochemical markers of iron metabolism would clarify the mechanisms behind hemoglobin improvements. Comparisons across different varieties of dates or varying daily quantities could help determine optimal dosing. Studies incorporating dietary monitoring or structured nutritional counseling may also illuminate the broader role of food-based strategies in maternal anemia management.

Overall, the study advanced the understanding of how culturally relevant foods can be integrated into maternal health strategies. The results supported the concept that evidence-based nutrition does not always require complex or costly interventions when nutrient-rich, widely accepted foods can provide meaningful clinical benefits.

Conclusion

The study demonstrated that daily date fruit supplementation improved hemoglobin levels and reduced maternal fatigue in third-trimester anemia, achieving outcomes comparable to standard iron–folate therapy. These findings highlighted the value of incorporating culturally

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familiar, nutrient-rich foods into antenatal care, particularly where supplement adherence is challenging. Date fruits offered a practical, well-tolerated option that may complement existing anemia-management strategies and support maternal well-being.

AUTHOR'S CONTRIBUTIONS

Author	Contribution
Hina Maqbool*	Designed the study, performed data collection and analysis, and prepared the manuscript. Approved the final draft for submission.
Musab Bin Zubair	Contributed to study design, data acquisition, interpretation of findings, and performed critical review and editing of the manuscript. Approved the final draft for submission.
Iqra Yaqoob	Significantly contributed to data collection and analysis. Reviewed and approved the final manuscript for publication.

References

1. Nyamete F, Majaliwa N, Chove LJW. Food-Based Intervention for Boosting Micronutrient Status and Health-A Comprehensive Review. 2024;8(1):23-34.

2. SAHARA IA. DIETARY PRACTICES, IRON FOLIC ACID SUPPLEMENTATION AND IRON STATUS OF PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT NAROK COUNTY REFERRAL HOSPITAL, KENYA 2024.

3. Abioye A, Owopetu C, Adamu-Adedipe F, Odesanya LO, Olofin-Samuel MA. Anaemia Prevention Among Pregnant Women. IJNMH; 2024.

4. Hasiri S, Gupta N, Garg N, Singh AK. NUTRITION AND HEALTH: EMERGING PERSPECTIVES FOR SUSTAINABLE WELL-BEING.

5. Singh H. The Impact of Multi-Vitamin and Mineral Supplementation on the Nutritional Health of Pregnant Women in India: The Pregnancy Nutrition Guide: BFC Publications; 2025.

6. Oladiji AT, Oladele JO, Ajayi EI. Nutrition and diet in health: Principles and applications: CRC Press; 2024.

7. Lombardo M, Johnston C, editors. Abstracts of the 4th International Electronic Conference on Nutrients (IECN 2024), 16–18 October 2024. Biology and Life Sciences Forum; 2024: MDPI.

8. Premachandran K, Wilson Alphonse CR, Soundharapandiyan NJMN, Research F. Nourishing the cognition with millets: A comprehensive review of their nutritional impact and potential as cognitive enhancers. 2023;67(24):2300450.

9. Das K, Roy P, Tiwari RKSJP-BD. Biofortification of rice, an impactful strategy for nutritional security: current perspectives and future prospect. 2023.

10. Wollmar M. Opportunities and challenges with the shift to climate-adapted food consumption: Balancing nutrition, climate impact, and acceptance in public and private meals. 2025.

11. Rani J, Beniwal D, Dhull SS, Gulia V, Sangwan P, Abdi GJDS. Biofortification of Cicer arietinum to enhance nutrient-rich diets in semi-arid regions. 2025;6(1):643.

12. Goldman DM, Nagra M, Warbeck C, Winings E, Landry MJ. Plant-Based Diets: Nutritional Considerations and Public Health Implications. Handbook of Public Health Nutrition: International, National, and Regional Perspectives: Springer; 2025. p. 1-27.

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13. Spiro A, Bardon L, Fanzo J, Hill Z, Stanner S, Traka MJNB. Every Person Counts in a Fair Transition to Net Zero: A UK Food Lens Towards Safeguarding Against Nutritional Vulnerability. 2025.

14. Mallonee LF, Boyd L, Stegeman CA. The Dental Hygienist's Guide to Nutritional Care E-Book: The Dental Hygienist's Guide to Nutritional Care E-Book: Elsevier Health Sciences; 2024.

15. Akelola RW. EFFECT OF FOOD BASED NUTRITION INTERVENTION; PROLCARMIV ON MANAGEMENT OF NONCOMMUNICABLE DISEASES AMONG PEOPLE LIVING WITH HIV IN BUSIA, KENYA. 2023.

16. Yu X, Liu X, Li HJFiN. Nutrient metabolism and complications of type 2 diabetes mellitus: implications for rehabilitation and precision care. 2025;12:1699259.

17. Yang Y, Han J, Qiu M, He Y, Li C, editors. Remarks and Abstracts of the 14th Asian Congress of Nutrition in Chengdu, China, 14–17 September 2023. Biology and Life Sciences Forum; 2024: MDPI.

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