Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037
DOI: https://doi.org/10.71357/hsij.v3i1.57

Original Research

Effectiveness of consuming dates in increasing hemoglobin levels in pregnant women with anemia

Nur Aini Nurdin[1], Meldawati[1*], Frani Mariana[1], Putri Vidiasari Darsono[2]

[1]*Department of Midwifery, Faculty of Health, Sari Mulia University, Banjarmasin, Indonesia*
[2]*Department of Pharmacy, Faculty of Health, Sari Mulia University, Banjarmasin, Indonesia*

[*]Corresponding author: meldawatialbar05@gmail.com

ARTICLE INFO

Article history:
Received 31 December 2024
Accepted 24 January 2025
Published 28 February 2025

Keywords:
Anemia in pregnancy
Date fruit intervention
Hemoglobin level improvement
Iron deficiency
Maternal nutrition strategies

ABSTRACT

Background: Anemia in pregnancy is a major global health issue, affecting maternal and fetal outcomes. It is often caused by iron deficiency due to increased physiological demands and inadequate nutritional intake. Dietary interventions, including consuming dates (*Phoenix dactylifera*), are gaining attention as complementary strategies to address this issue.

Objective: This study aimed to evaluate the effectiveness of consuming dates in improving hemoglobin levels among pregnant women with anemia.

Method: A quasi-experimental study with a one-group pre-test and post-test design was conducted. Twenty-two anemic pregnant women from the Tanjung Aru Community Health Center participated, consuming seven tamr dates (approximately 100 g) daily for 14 days. Hemoglobin levels were measured pre- and post-intervention using the Point of Care Testing (POCT) method. Data were analyzed using paired t-tests to determine statistical significance.

Results: Before the intervention, 68.2% of participants had mild anemia, and 31.8% had moderate anemia, with no cases of normal hemoglobin levels. Post-intervention, 45.4% of participants achieved normal hemoglobin levels, while cases of mild and moderate anemia decreased to 36.4% and 18.2%, respectively. The mean hemoglobin level increased significantly from 13.81 g/dL pre-intervention to 14.62 g/dL post-intervention ($p = 0.013$).

Conclusion: Consuming dates effectively improved hemoglobin levels in pregnant women with anemia, offering a promising, culturally appropriate dietary intervention. Further research with larger populations is recommended to validate these findings and explore long-term outcomes.

1. Introduction

Pregnancy begins with the fertilization of an egg and continues until the birth of the baby, approximately 280 days or 40 weeks. It is a period where the fetus develops within the uterus. Pregnancy induces various physiological changes, is a sensitive period for both the

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

mother and fetus, with potential impacts on mental health and stress response systems (Davis & Narayan, 2020; Debnath & Watane, 2024; Musa, 2023). Maintaining health during pregnancy is crucial for both maternal and fetal well-being, particularly in preventing anemia, which poses significant risks. Anemia affects approximately 50% to 63% of pregnant women globally, leading to complications such as low birth weight (27.7%), premature births, pre-eclampsia, postpartum hemorrhage, and increased maternal mortality (Abiodun-Ojo et al., 2024; Ashfya et al., 2023; Bhati et al., 2024; Mehra & Rani, 2020).

Anemia in pregnancy is defined as a condition where a pregnant woman's hemoglobin levels fall below 11 g/dL, indicating a deficiency in red blood cells that can adversely affect both maternal and fetal health. This condition is prevalent globally, particularly in developing countries, where it poses significant risks for mother and fetus. Iron deficiency anemia is the most prevalent type, often resulting increased iron requirements due to physiological changes, poor dietary intake, and underlying health conditions. During pregnancy, blood volume expands, and the fetus requires additional iron for growth, leading to a sharp increase in iron demand. The prevalence of iron deficiency can reach up to 30% antenatally and 40% postnatally (Bhalerao et al., 2023; Obianeli et al., 2024; Thurairasu et al., 2023; Yang & Seo, 2023). The treatment of anemia in pregnant women in Indonesia involves a multifaceted approach that includes dietary interventions, supplementation, and health education. Given the high prevalence of anemia, particularly among young mothers, effective strategies are essential for improving maternal and fetal health outcomes. Alternative and complementary nutritional strategies, like consuming dates, may offer additional benefits. As is well known, plants have long been utilized by humans for various purposes, including health and well-being (Hidayani et al., 2023; Mukti, 2024; Rahmah et al., 2024).

The date palm, scientifically known as *Phoenix dactylifera*, is a significant fruit-bearing tree belonging to the Arecaceae family. It has been cultivated for over 6000 years, primarily in the Middle East and North Africa, where it serves as a vital food source and holds cultural importance. The fruit is rich in essential nutrients and exhibits various health benefits, making it a subject of extensive research. They are an excellent source of carbohydrates, proteins, vitamins, and minerals, providing a rich energy source. They contain significant amounts of dietary fiber, which aids in digestion. Dates are rich in iron, with a notable content of 13.7 mg per 100 grams, which is essential for hemoglobin production. They also contain vitamins such

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

as riboflavin, thiamine, and folic acid, which support overall health and enhance iron absorption (Al-Talaqany et al., 2023; Fadhila et al., 2023; Jalal et al., 2024; Jaouhari et al., 2024; Siswanto et al., 2024).

Studies show that consuming dates can lead to an increase in hemoglobin levels. For instance, one study reported an average increase of 0.89 g/dL in hemoglobin after consuming 100 grams of ajwa dates daily for four weeks (Handayani et al., 2024). Another review highlighted that 50% of the analyzed studies found significant improvements in hemoglobin levels among anemic patients after date consumption (Amaris & Rachman, 2022). This aligns with findings in other regions, where dates are used traditionally to support maternal health. However, despite the known benefits, the utilization of dates in Indonesia as a nutritional intervention for anemia in pregnancy remains underexplored. Public awareness and incorporation into maternal nutrition programs are limited, representing a significant gap in current practices.

Iron tablets are widely used to prevent iron deficiency anemia during pregnancy; however, they come with several limitations that can affect their effectiveness. These limitations include issues related to compliance, side effects, and the overall health context of pregnant women. Many side effects of iron supplementation mimic normal pregnancy symptoms, complicating the decision to continue taking the tablets (Stanworth et al., 2024). To address these gaps, there is a pressing need for targeted research that investigates the efficacy of dates in managing anemia among pregnant women. Understanding the optimal quantity and frequency of date consumption, as well as its impact on different severities of anemia, can provide valuable insights for integrating this approach into maternal nutrition programs. This study aims to determine the effect of date consumption on hemoglobin levels in pregnant women with anemia.

Method

Research design

This study employed a quasi-experimental design, specifically a one-group pre-test and post-test approach. This design allowed the researchers to measure changes in hemoglobin (Hb) levels before and after the intervention. The primary goal was to determine the effect of consuming dry dates (tamr) on increasing Hb levels in pregnant women with anemia.

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

Respondent

The study population consisted of anemic pregnant women registered at Tanjung Aru Community Health Center, Paser, Indonesia. A total of 22 respondents were selected using a purposive sampling technique to ensure the inclusion of participants who met the study criteria. Respondents were required to have an Hb level below 11 gr/dl and provide written informed consent before participating in the study.

Data collection

Data collection was carried out using the Point of Care Testing (POCT) method to measure hemoglobin levels. Pre-test measurements were taken before the intervention, while post-test measurements were conducted after 14 days of consuming 7 pieces (approximately 100 gr) of tamr dates daily. The POCT method was chosen for its accuracy and efficiency in assessing hemoglobin levels in a clinical setting.

Data Analysis

The data were analyzed using a paired t-test to compare hemoglobin levels before and after the intervention. This statistical test was chosen for its suitability in evaluating pre- and post-intervention changes within the same group. SPSS version 26 was employed to ensure precise data processing and analysis. The significance level was set at 5% (p-value < 0.05), allowing robust evaluation of the intervention's impact on hemoglobin levels.

Instrument validity and reliability were also verified to ensure the accuracy of the collected data. The hemoglobin measurement was conducted using POCT method, which is validated for its precision in clinical applications. Reliability was confirmed through repeated testing, which produced consistent hemoglobin readings across samples.

Ethical consideration

The study received ethical approval No. 083/KEP-UNISM/II/2024 from the Research Ethics Committee of Sari Mulia University. All participants provided written informed consent before the study commenced. Confidentiality of participants' personal data was strictly maintained, and the research adhered to the principles of justice, beneficence, and non-maleficence.

2. Results

Respondent characteristics

Table 1 above shows that respondents based on age are dominated by not risk age (20-

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

35 years) which is 15 respondents (68.2%). Respondents based on parity, the majority of respondents are multigravida, which is 16 respondents (73%). Based on gestational age, it was found that the most respondents' gestational age was in the third trimester (28-41 weeks) which amounted to 11 respondents (50%).

Table 1. Characteristics of respondents

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
Risk (<20 or >35)	7	22.8
Not at Risk (20 - 35)	15	68.2
Parity		
Multigravida	16	72.7
Primigravida	6	27.3
Gestational Age		
1st Trimester	5	22.7
2nd Trimester	6	27.3
3th Trimester	11	50
Total	22	100

Distribution of anemia incidents on pre- and post- intervention

Table 2 presents the frequency and percentage of anemia cases categorized by hemoglobin levels both pre- and post-intervention. Initially, no respondents were classified as having normal hemoglobin levels (>11 gr/dL). However, after the intervention, 45.4% of respondents achieved normal hemoglobin levels. Mild anemia cases (9–10.9 gr/dL) decreased from 68.2% pre-intervention to 36.4% post-intervention. Similarly, cases of moderate anemia (7–8.9 gr/dL) reduced from 31.8% to 18.2%. These results highlight the potential benefits of tamr dates in improving hemoglobin levels and reducing anemia severity.

Table 2. Frequency distribution incident of anemia pre- and post- intervention

Anemia Categories	Hemoglobin level	Pre-Intervention		Post-Intervention	
		Frequencies	Percentages (%)	Frequencies	Percentages (%)
Normal	>11 gr/dL	0	0	10	45.4
Mild	9 - 10.9 gr/dL	15	68.2	8	36.4
Moderate	7 - 8.9 gr/dL	7	31.8	4	18.2

Effectiveness of timr dates on hemoglobin levels pre- and post- intervention

Table 3 provides a statistical analysis of hemoglobin levels before and after the intervention of consuming 7 tamr dates daily for 14 days. The data include mean hemoglobin levels, mean differences (MD), standard deviations (SD), 95% confidence intervals (CI), t-values, and p-values. The results indicate a significant increase in mean hemoglobin levels

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

from 13.81 pre-intervention to 14.62 post-intervention, with a mean difference of -8.09 ± 1.39. The paired t-test analysis revealed a statistically significant improvement in hemoglobin levels (t = -2.725, p = 0.013). These findings suggest dates effectively elevated hemoglobin levels in pregnant women with anemia.

Table 3. Effectiveness of timr dates on hemoglobin levels pre- and post- intervention

	Hemoglobin Level					t	p-value
	Mean	SD	MD	95% CI			
				Lower	Upper		
Pre-	13.81	20.17	-8.09 ± 1.39	-11.426	-1.917	-2.725	0.013
Post-	14.62	21.55					

Notes: MD is mean different; SD is standard deviation; CI is confident interval.

4. Discussions

This study shows demographic aligns with findings that maternal age significantly influences pregnancy outcomes, with younger and older maternal ages (<20 or >35 years) associated with increased risks of complications, including anemia (Kozuki et al., 2012; Kusumawati et al., 2024; Nyongesa et al., 2023; Rangel et al., 2023). Additionally, most respondents were multigravida (72.7%), indicating repeated pregnancies among most participants. Parity has been shown to correlate with anemia, as repeated pregnancies can deplete maternal iron stores (WHO, 2023). The predominance of multigravida women suggests a potential cumulative nutritional burden that might predispose them to anemia during pregnancy (Nidhi & Jha, 2023).

Gestational age distribution revealed that 50% of respondents were in their third trimester, a critical period where the physiological demand for iron peaks (Cai et al., 2020; Fisher & Nemeth, 2017; Kling & Coe, 2016). This is significant because anemia often worsens during the later stages of pregnancy due to increased demands for fetal growth and iron requirements (Garzon et al., 2020; Tian et al., 2024). The relatively small proportion of respondents in the first trimester (22.7%) may explain why the baseline hemoglobin levels were moderately low, as iron depletion typically worsens as pregnancy progresses.

Study highlights the frequency distribution of anemia before and after intervention. Initially, 68.2% of respondents had mild anemia (hemoglobin [Hb] levels: 9–10.9 g/dL), and 31.8% experienced moderate anemia (Hb levels: 7–8.9 g/dL). These findings align with the global prevalence of anemia in pregnancy, with mild anemia being more common than severe

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

cases (Putra et al., 2024). The absence of normal hemoglobin levels before intervention underscores the critical need for effective anemia management strategies in this cohort. Post-intervention data indicate significant improvements in hemoglobin levels. Normal hemoglobin levels (>11 g/dL) were achieved by 45.4% of respondents, while cases of mild anemia decreased to 36.4%, and moderate anemia reduced to 18.2%. These results underscore the effectiveness of the intervention, which involved date fruit consumption. Dates are rich in iron, folate, and vitamin C, which enhance hemoglobin synthesis and iron absorption (Abo-El-Saad & Shawir, 2024; Fadhila et al., 2023; Fathimah et al., 2022; Rahmawati et al., 2022). Previous studies have similarly demonstrated the efficacy of dietary interventions in managing anemia during pregnancy, particularly with natural iron-rich foods (Hashem Elsalous et al., 2024; Skolmowska et al., 2022).

Comparative test further supports these findings, illustrating statistically significant improvements in hemoglobin levels post-intervention. The mean hemoglobin level increased from 13.81 g/dL (pre-intervention) to 14.62 g/dL (post-intervention), with a mean difference (MD) of −8.09 ± 1.39. The lower and upper bounds of the 95% confidence interval (CI) ranged from −11.426 to −1.917, and the t-value (−2.725) indicated statistical significance ($p = 0.013$). These results highlight the intervention's potential to mitigate anemia effectively. These findings align with literature highlighting the incremental benefits of nutritional interventions over time (Xu et al., 2022).

The improvement in hemoglobin levels highlights the importance of targeted dietary interventions during pregnancy. Dates, as a rich source of iron, fiber, and natural sugars, may address both nutritional deficiencies and energy needs. Previous research has shown that the natural composition of dates can enhance iron absorption and reduce anemia severity when consumed regularly (Abo-El-Saad & Shawir, 2024; Fathimah et al., 2022). This underscores the significance of culturally appropriate dietary recommendations in addressing anemia among pregnant women.

The improvements observed in this study also have broader implications for maternal and neonatal health. Anemia during pregnancy is associated with adverse outcomes, including preterm birth, low birth weight, and increased maternal mortality (Kozuki et al., 2012) By addressing anemia through simple and effective interventions like date consumption, these risks can be mitigated, contributing to better health outcomes for both

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

mothers and their babies.

The findings of this study are consistent with global trends showing the effectiveness of dietary modifications in combating anemia. However, several limitations must be acknowledged. The small sample size (n=22) restricts the generalizability of the findings to a broader population. Future studies should include larger, more diverse cohorts to validate the efficacy of the intervention. Additionally, the study's reliance on a single dietary component may overlook other contributory factors, such as overall dietary patterns and socioeconomic conditions.

Enhancing individuals' knowledge and attitudes about anemia prevention can effectively reduce pregnancy complications and the risk of stunting (Palimbo et al., 2024). Furthermore, this study contributes to the growing body of evidence supporting non-pharmacological approaches to anemia management. The significant reduction in anemia severity post-intervention underscores the potential of natural dietary supplements as a complement to existing iron supplementation programs. Future research should explore long-term outcomes and compliance rates with dietary interventions to optimize maternal health policies and promote sustainable anemia prevention strategies.

5. Conclusion

This study highlights the effectiveness of consuming dates (*Phoenix dactylifera*) as a dietary intervention to improve hemoglobin levels in pregnant women with anemia. Significant improvements were observed, with a reduction in cases of mild and moderate anemia and an increase in normal hemoglobin levels. The statistical analysis further supports the intervention’s efficacy, demonstrating a significant increase in mean hemoglobin levels post-intervention. These findings underscore the potential of culturally appropriate and nutrient-rich dietary strategies to complement existing anemia management programs during pregnancy, ultimately contributing to better maternal and fetal health outcomes.

6. Conflict of interest

All authors declare no conflict of interest.

7. References

Abiodun-Ojo, O. E., Bello, C. B., & Ogundipe, L. O. (2024). Prevention of anaemia in pregnancy: A five-year scoping review. *Current Women s Health Reviews*, *20*. https://doi.org/10.2174/0115734048283699240429110405

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

Abo-El-Saad, M. M., & Shawir, S. M. S. (2024). Nutritional and medicinal value of mineral elements in dates. *The Egyptian Science Magazine*, *11*(1), 43–51. https://doi.org/10.21608/esm.2024.363675

Al-Talaqany, S. M., Marza, A. T., & Baiee, F. (2023). Date palm [*Phoenix dactylifera*]: Description, components, importance, and medical uses: A review. *Kufa Journal For Veterinary Medical Sciences*, *14*(2), 42–53. https://doi.org/10.36326/kjvs/2023/v14i211950

Amaris, A. F., & Rachman, H. S. (2022). The effect of giving dates (*Phoenix dactylifera*) on hemoglobin levels in anemia patients [in Indonesia]. *Jurnal Riset Kedokteran*, 123–134. https://doi.org/10.29313/jrk.vi.1538

Ashfya, A., Bhavya H. U., Doppa, G., & Ravikanth, G. O. (2023). Prospective study on prevalence of anemia in pregnant women and its association with maternal and fetal outcome. *Global Journal for Research Analysis*, 63–65. https://doi.org/10.36106/gjra/8102351

Bhalerao, M. M., Vikhe, B. B., Sanap, A. D., & Vikhe, R. B. (2023). Anemia in pregnancy: A case control study from India. *Panacea Journal of Medical Sciences*, *13*(1), 136–139. https://doi.org/10.18231/j.pjms.2023.028

Bhati, B. S., Bajpai, S., Patel, M., Gori, M., & Panasara, P. (2024). Maternal anemia: A comprehensive study on fetomaternal consequences from menarche to menopause. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, *13*(11), 3056–3060. https://doi.org/10.18203/2320-1770.ijrcog20242997

Cai, J., Ren, T., Lu, J., Wu, J., Mao, D., Li, W., Zhang, Y., Li, M., Piao, J., Yang, L., Ma, Y., Wang, J., & Yang, X. (2020). Physiologic requirement for iron in pregnant women, assessed using the stable isotope tracer technique. *Nutrition & Metabolism*, *17*(1), 33. https://doi.org/10.1186/s12986-020-00452-0

Davis, E. P., & Narayan, A. J. (2020). Pregnancy as a period of risk, adaptation, and resilience for mothers and infants. *Development and Psychopathology*, *32*(5), 1625–1639. https://doi.org/10.1017/S0954579420001121

Debnath, Dr. S., & Watane, Dr. P. (2024). Leading indications in pregnancy period [Dr. H.C. Allen.]. *International Journal of Applied Research*, *10*(2), 54–55. https://doi.org/10.22271/allresearch.2024.v10.i2a.11524

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

Fadhila, U. T., Royani, I., Murfat, Z., Mappaware, N. A., & Khalid, N. (2023). The effect of consuming ajwa dates (*Phoenix dactylifera*) on hemoglobin levels in pregnant women with anemia. *MAHESA : Malahayati Health Student Journal*, *3*(10), 3203–3217. https://doi.org/10.33024/mahesa.v3i10.11168

Fathimah, F., Aprilia, V. I., Pibriyanti, K., Luthfiya, L., & Nabawiyah, H. (2022). The effect of date fruits (*Phoenix dactylifera* L) intervention to increase hemoglobin levels in female adolescents. *Media Gizi Mikro Indonesia*, *13*(2), 97–104. https://doi.org/10.22435/mgmi.v13i2.5138

Fisher, A. L., & Nemeth, E. (2017). Iron homeostasis during pregnancy. *The American Journal of Clinical Nutrition*, *106*, 1567S-1574S. https://doi.org/10.3945/ajcn.117.155812

Garzon, S., Cacciato, P. M., Certelli, C., Salvaggio, C., Magliarditi, M., & Rizzo, G. (2020). Iron deficiency anemia in pregnancy: Novel approaches for an old problem. *Oman Medical Journal*, *35*(5), e166–e166. https://doi.org/10.5001/omj.2020.108

Handayani, T. Y., Sari, D. P., & Tarigan, R. A. (2024). Consumption of dates (*Phoenix dactylifera*) on increasing hemoglobin in adolescents with anemia. *Jurnal Kesehatan*, *15*(1), 1–7. https://doi.org/10.38165/jk.v15i1.422

Hashem Elsalous, S., El Saied Mahmoud Dawoud, S., Ragab Ahmed Salama, T., & Elsayed Ahmed Shahin, H. (2024). Effectiveness of dietary intervention-based short message service on pregnant adolescent female's knowledge and practice regarding iron deficiency anemia. *Egyptian Journal of Health Care*, *15*(2), 458–475. https://doi.org/10.21608/ejhc.2024.354362

Hidayani, Y. D., Maolinda, W., & Mahdiyah, D. (2023). The effectiveness of providing complementary therapy of turmeric and kencur herbal medicine to postpartum mothers to increase breast milk volume in the working area of North Tapin Health Center. *Health Sciences International Journal*, *1*(1), 9–15. https://hsij.anandafound.com/journal/article/view/6

Jalal, B., Hamid, S., Alam, M., Wani, N. N., & Wani, K. R. (2024). Khajur (*Phoenix dactylifera* L.): Medicinal importance in perspective of Unani medicine and pharmacological studies. *Journal of Drug Delivery and Therapeutics*, *14*(11), 194–200. https://doi.org/10.22270/jddt.v14i11.6860

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

Jaouhari, Y., Disca, V., Ferreira-Santos, P., Alvaredo-López-Vizcaíno, A., Travaglia, F., Bordiga, M., & Locatelli, M. (2024). Valorization of date fruit (*Phoenix dactylifera* L.) as a potential functional food and ingredient: Characterization of fiber, oligosaccharides, and antioxidant polyphenols. *Molecules*, *29*(19), 4606. https://doi.org/10.3390/molecules29194606

Kling, P. J., & Coe, C. L. (2016). Iron homeostasis in pregnancy, the fetus, and the neonate. *NeoReviews*, *17*(11), e657–e664. https://doi.org/10.1542/neo.17-11-e657

Kozuki, N., Lee, A. C., & Katz, J. (2012). Moderate to severe, but not mild, maternal anemia is associated with increased risk of small-for-gestational-age outcomes 3. *The Journal of Nutrition*, *142*(2), 358–362. https://doi.org/10.3945/jn.111.149237

Kusumawati, I., Murti, B., & Pamungkasari, E. P. (2024). Meta-analysis of associations between maternal age, low hemoglobin level during pregnancy, low birth weight, and preterm birth. *Journal of Maternal and Child Health*, *8*(6), 762–775. https://doi.org/10.26911/thejmch.2023.08.06.10

Mehra, R., & Rani, J. (2020). Anaemia in Pregnancy. In *Labour Room Emergencies* (pp. 85–94). Springer Singapore. https://doi.org/10.1007/978-981-10-4953-8_9

Mukti, B. H. (2024). Ethnobotanical studies of medicinal plants in Borneo: Bridging tradition and pharmaceutical research. *Health Sciences International Journal*, *2*(2), 154–168. https://hsij.anandafound.com/journal/article/view/41

Musa, M. I. S. (2023). Effect of pregnancy stages on changes in lipid profiles. *Journal for Research in Applied Sciences and Biotechnology*, *2*(1), 26–30. https://doi.org/10.55544/jrasb.2.1.6

Nidhi, & Jha, A. N. (2023). Study of anemia during pregnancy in multigravida women. *Uttar Pradesh Journal of Zoology*, *44*(21), 209–215. https://doi.org/10.56557/upjoz/2023/v44i213690

Nyongesa, P., Ekhaguere, O. A., Marete, I., Tenge, C., Kemoi, M., Bann, C. M., Bucher, S. L., Patel, A. B., Hibberd, P. L., Naqvi, F., Saleem, S., Goldenberg, R. L., Goudar, S. S., Derman, R. J., Krebs, N. F., Garces, A., Chomba, E., Carlo, W. A., Mwenechanya, M., … Esamai, F. (2023). Maternal age extremes and adverse pregnancy outcomes in low-resourced settings. *Frontiers in Global Women's Health*, *4*. https://doi.org/10.3389/fgwh.2023.1201037

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

Obianeli, C., Afifi, K., Stanworth, S., & Churchill, D. (2024). Iron deficiency anaemia in pregnancy: A narrative review from a clinical perspective. *Diagnostics*, *14*(20), 2306. https://doi.org/10.3390/diagnostics14202306

Palimbo, A., Bamegawati, I. M., Mahdiyah, D., Herawati, A., Rahman, L. H., Fariana, Y. R. N., & Arfiah. (2024). Overcoming anemia in prospective brides and grooms as an effort to prevent stunting. *Health Sciences International Journal*, *2*(2), 115–122. https://hsij.anandafound.com/journal/article/view/28

Putra, I. I., Sondakh, J. M. M., & Kaeng, J. J. (2024). Anemia in pregnancy and its maternal perinatal outcome. *Indonesian Journal of Obstetrics and Gynecology*, 141–146. https://doi.org/10.32771/inajog.v12i3.1989

Rahmah, L., Yuliana, F., Palimbo, A., Wahdah, R., & Rahayu, I. P. (2024). Treatment of perineal wounds using complementary alternative therapies: Evidence based case review. *Health Sciences International Journal*, *2*(1), 24–33. https://hsij.anandafound.com/journal/article/view/14

Rahmawati, A., Wulandari, R. C. L., Arisanti, A. Z., & Nurrokhmah, A. (2022). The effect of date juice and honey on increasing hemoglobin in pregnant women with anemia. *International Journal of Islamic and Complementary Medicine*, *3*(2), 57–64. https://doi.org/10.55116/IJICM.V3I2.43

Rangel, A. U. M., Barroso, M. C. B., Rangel Filho, F. A., De Oliveira, M. F., Domeneguetti, J. C., Pinto, N. V., Brilhante, A. V. M., & Frota, M. A. (2023). Perinatal outcomes of adolescent and adult mothers: a systematic review. *Arquivos de Ciências Da Saúde Da UNIPAR*, *27*(6), 2833–2845. https://doi.org/10.25110/arqsaude.v27i6.2023-044

Siswanto, S., Rasyid, H., Ramadhani, N. A., Caesar, N. N., Sunusi, N., & Zainuddin, Z. D. (2024). Average linkage clustering method and molecular docking study on date palm (*Phoenix dactylifera* L) as potential anti-anemia agent. *BAREKENG: Jurnal Ilmu Matematika Dan Terapan*, *18*(4), 2459–2470. https://doi.org/10.30598/barekengvol18iss4pp2459-2470

Skolmowska, D., Głąbska, D., Kołota, A., & Guzek, D. (2022). Effectiveness of dietary interventions in prevention and treatment of iron-deficiency anemia in pregnant women: A systematic review of randomized controlled trials. *Nutrients*, *14*(15), 3023. https://doi.org/10.3390/nu14153023

Health Sciences International Journal (HSIJ)
Vol. 3, No. 1, February 2025, pp. 80 – 92
ISSN: 3026-5037 DOI: https://doi.org/10.71357/hsij.v3i1.57

Stanworth, S. J., Churchill, D., Sweity, S., Holmes, T., Hudson, C., Brown, R., Lax, S. J., Murray, J., Spiby, H., Roy, N., Farmer, A., Gale, C., Crayton, E., Lorencatto, F., Griffiths, J., Mullings, J., Last, S., & Knight, M. (2024). The impact of different doses of oral iron supplementation during pregnancy: a pilot randomized trial. *Blood Advances*, *8*(21), 5683–5694. https://doi.org/10.1182/bloodadvances.2024013408

Thurairasu, V., Marimuthoo, P., & Kumareswaran, S. (2023). A pragmatic approach to anemia in pregnancy: An overview. *European Journal of Medical and Health Sciences*, *5*(1), 23–27. https://doi.org/10.24018/ejmed.2023.5.1.1665

Tian, M.-L., Ma, G.-J., Du, L.-Y., Xiao, Y.-G., Zhang, Y., & Tang, Z.-J. (2024). Prevalence and adverse perinatal outcomes of anaemia in the third trimester of pregnancy in Hebei Province, China. *International Health*, *16*(1), 91–96. https://doi.org/10.1093/inthealth/ihad028

WHO. (2023). *Anaemia*. WHO. https://www.who.int/maternal-health/anemia

Xu, S., Zheng, H., Tang, Z., Gu, Z., Wang, M., Tang, C., Xie, Y., Kong, M., Jing, J., Su, Y., & Zhu, Y. (2022). Antenatal iron-rich food intervention prevents iron-deficiency anemia but does not affect serum hepcidin in pregnant women. *The Journal of Nutrition*, *152*(6), 1450–1458. https://doi.org/10.1093/jn/nxac065

Yang, S.-W., & Seo, Y.-S. (2023). Iron deficiency anemia in pregnancy. *Journal of The Korean Society of Maternal and Child Health*, *27*(2), 45–50. https://doi.org/10.21896/jksmch.2023.27.2.45