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The Impact of *Moringa Oleifera* Leaf Extract on Hemoglobin Level Improvement in Postpartum Women with Anemia

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ABSTRACT

Introduction: Postpartum anemia is a common obstetric problem that significantly contributes to maternal morbidity and mortality. This condition, which affects 50–80% of women within the first 48 hours after childbirth, can hinder lactation, delay uterine involution, and pose serious health risks. Moringa (*Moringa oleifera*) leaves, known for their high iron content and nutritional value, have been suggested as a natural alternative to improve hemoglobin levels. This study aimed to examine the effect of moringa leaf extract on increasing hemoglobin levels in postpartum women with anemia at Kuanfatu Public Health Center in 2024. **Materials and Methods:** A pre-experimental study with a one-group pretest-posttest design was conducted on 30 purposively selected postpartum women. The intervention involved administering moringa leaf extract. Hemoglobin levels were measured before and after the intervention. Data were analyzed using paired *t*-test with a significance level of 0.05. **Results and Discussion:** Prior to the intervention, hemoglobin levels ranged from 7–10 g/dL, while post-intervention levels increased to 10–12 g/dL. The mean hemoglobin level rose from 8.657 g/dL to 10.927 g/dL, with a mean difference of 2.27 g/dL ($p < 0.001$). All participants showed improved hemoglobin levels after receiving moringa extract. **Conclusion:** The administration of *Moringa oleifera* leaf extract significantly increased hemoglobin levels in postpartum women with anemia. This suggests that moringa can be considered a beneficial nutritional intervention during the puerperium period to support maternal recovery.

Keywords: Postpartum anemia, hemoglobin, moringa oleifera extract

INTRODUCTION

Anemia is a condition characterized by a hemoglobin concentration of less than 10.5 g/dL or a reduced capacity of the blood to carry oxygen due to decreased hemoglobin levels. It is commonly defined as a hemoglobin level below the normal range: 13.5 g/dL in men, 11.5 g/dL in women, and 11.0 g/dL in children. In postpartum women, anemia is defined as a hemoglobin concentration below 10 g/dL and is a prevalent issue in obstetrics.

According to the WHO (2011), anemia occurs when the number of red blood cells or the amount of hemoglobin in them is lower than normal. Specifically, anemia in the postpartum period is defined as a hemoglobin level <10 g/dL (Api, et al., 2020). This condition can lead to iron deficiency, disrupt lactation, and impair uterine contraction due to inadequate oxygen supply to the uterus (WHO, 2011).

The postpartum period (puerperium) begins after the expulsion of the placenta and lasts until the reproductive organs, particularly the uterus, return to their pre-pregnancy state. It typically starts two hours after placental delivery and continues for approximately six weeks (42 days) (Aisien, 2021). The postpartum phase involves not only

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physiological but also psychological changes that may occur throughout this 6–8 weeks period (Bahrami et al., 2014). Hemoglobin is an iron-containing protein molecule found in red blood cells, capable of forming a loose and reversible bond with oxygen (Sherwood, 2011). It plays a crucial role in transporting oxygen from the lungs to the body tissues (Guyton and Hall, 2007).

Moringa (*Moringa oleifera*) leaves are known for their high iron content—up to 28.2 mg per 100 grams in powdered form—as well as other nutrients. For instance, moringa contains seven times more vitamin C than oranges, four times more vitamin A than carrots, four times more calcium than milk, three times more potassium than bananas, three times more iron than spinach, and twice the amount of protein found in yogurt or eggs. When dried and ground, the nutritional value of moringa leaves increases significantly—except for vitamin C—because the moisture is removed, releasing previously bound nutrients, making it an excellent natural supplement for preventing anemia in pregnant and postpartum women (Nur et al., 2020).

Moringa leaves have been extensively studied for their nutritional content and medicinal benefits. They are rich in calcium, iron, phosphorus, potassium, zinc, protein, and vitamins A, B, C, D, E, and K, as well as folic acid and biotin (Peñalver et al., 2022). Other studies have reported that moringa leaves contain 10 times more vitamin A than carrots, 50 times more vitamin B than sardines and legumes, 4 times more vitamin E than corn oil, 4 times more beta-carotene than carrots, 25 times more iron than spinach, 6 times more zinc than almonds, 15 times more potassium than bananas, 17 times more calcium than milk, and 9 times more protein than yogurt (Krisnadi, 2015).

MATERIALS AND METHODS

This study used a pre-experimental design using a one-group pretest–posttest approach. This design is characterized by assessing cause-and-effect relationships through the involvement of a single group of subjects—in this case, postpartum mothers serving as the treatment group. A pretest was administered prior to the intervention to establish baseline data, followed by a posttest conducted after the intervention.

The sampling technique used was purposive sampling, resulting in a total of 30 respondents. The independent variables in this study were hemoglobin level improvement and the administration of *Moringa oleifera* extract, while the dependent variable was the hemoglobin level in postpartum mothers with anemia.

Data were analyzed using a paired t-test, as the same subjects were measured twice (before and after the intervention). Statistical significance was determined at the 95% confidence level ($\alpha = 0.05$). A p-value ≤ 0.05 was considered statistically significant, indicating a meaningful difference in hemoglobin levels before and after the administration of *Moringa oleifera* extract.

RESULTS

Based on **table 1**, it was found that among the 30 respondents, the hemoglobin levels before consuming *Moringa oleifera* leaf extract were as follows: 7–8 g/dL in 7 respondents (23%), 8–9 g/dL in 15 respondents (50%), and 9–10 g/dL in 8 respondents (27%). After the intervention, hemoglobin levels increased, with 15 respondents (50%) having levels of 10–11 g/dL and the remaining 15 respondents (50%) reaching 11–12 g/dL.

As shown in **table 2**, the mean hemoglobin level increased from 8.657 g/dL (pre-test) to 10.927 g/dL (post-test). The smaller standard deviation in the post-test results indicates a more consistent outcome following the intervention. **Table 2** also displays the relationship between the pre-test and post-test variables. The correlation coefficient between pre- and post-test hemoglobin levels was 0.618, indicating a moderately strong positive relationship between the two measurements. The one-sided p-value was <0.001, and the two-sided p-value was also <0.001, both of which are less than the significance level of 0.05. These results confirm that the correlation is statistically significant.

Table 3 demonstrates the presence or absence of differences between pre-test and post-test values. The mean difference in hemoglobin levels between the pre-test and post-test was 2.27 g/dL, indicating an increase in hemoglobin levels. The standard deviation of the differences was 0.424, suggesting that most individuals experienced similar improvements. The standard error of the mean was 0.077, indicating high precision in the estimate of the mean difference, the significance value (2-tailed) was 0.001, which is less than 0.05. Therefore, it can be concluded that there is a statistically significant difference in hemoglobin levels before and after the administration of Moringa extract in postpartum women with anemia.

Table 1 Respondent characteristics and study variables

Characteristic / Variable	Frequency	Percentage (%)
Age		
20 – 30 years	8	26.7
30 – 40 years	17	56.7
40 – 50 years	5	16.6
Education Level		
Elementary School	15	50
Junior High School	8	26.7
Senior High School	5	23.3
Occupation		
Housewife	30	100
Entrepreneur	0	0
Civil Servant	0	0
Hemoglobin Level (Pre-Test)		
7 – 8 g/dl	7	23
8 – 9 g/dl	15	50
9 – 10 g/dl	8	27
Hemoglobin Level (Post Test)		
7 – 8 g/dl	0	0
8 – 9 g/dl	15	50
9 – 10 g/dl	15	50

Table 2 Paired sample statistics and correlations

Variable	Mean	N	SD	Correlations	Significance	
					One-Sided p	*Two-Sided p*
Hemoglobin (Pre Test)	8.657	30	0.519	0.618	<0.001	<0.001
Hemoglobin (Post Test)	10.927	30	0.437			

Table 3 Paired sample test

Variable	Mean	SD	Std. Error Mean	Significance	
				One-Sided p	*Two-Sided p*
Hemoglobin (Pre Test) Hemoglobin (Post Test)	2.27	0.424	0.077	<0.001	<0.001

DISCUSSION

Based on table 1, it was found that among the 30 respondents, hemoglobin levels before consuming moringa leaf extract were as follows: 7–8 g/dL in 7 respondents (23%), 8–9 g/dL in 15 respondents (50%), and 9–10 g/dL in 8 respondents (27%). This condition reflects the presence of postpartum women who, during pregnancy—from the first to the third trimester—rarely consumed iron supplements and did not attend antenatal checkups with healthcare providers due to various reasons, including lack of time. These factors contributed to maternal conditions often associated with complaints such as fatigue and dizziness during pregnancy and can increase the risk of complications such as bleeding during labor.

Anemia is defined as a hemoglobin concentration of less than 10.5 g/dL or a reduced capacity of the blood to carry oxygen due to decreased hemoglobin levels. It is commonly defined as hemoglobin levels falling below the normal ranges of 13.5 g/dL for men, 11.5 g/dL for women, and 11.0 g/dL for children. In postpartum women, anemia is defined as a hemoglobin level below 10 g/dL and is a common issue in obstetrics. Even in pregnant women with adequate iron reserves, hemoglobin levels typically range between 11–12 g/dL prior to delivery. This condition is often

exacerbated by blood loss during childbirth and the postpartum period.

As shown in **table 1**, after the administration of moringa leaf extract, hemoglobin levels in the 30 respondents increased: 15 respondents (50%) had hemoglobin levels of 10–11 g/dL and the remaining 15 respondents (50%) had levels of 11–12 g/dL. This improvement suggests that the intake of moringa leaf extract led to a significant rise in hemoglobin levels among postpartum women with anemia. This is further supported by the mothers' willingness to improve their nutritional intake and dietary patterns, contributing to the accelerated recovery of hemoglobin levels. As a result, the postpartum women experienced reduced fatigue and dizziness and showed improved breast milk production. In addition to the moringa leaf extract, the postpartum mothers also consumed 60 iron tablets during the postpartum period.

Postpartum anemia is a common condition caused by blood loss during delivery, increased iron demand during pregnancy, and inadequate nutritional intake. It can lead to complications such as fatigue, dizziness, decreased immunity, and delayed postpartum recovery. One natural alternative that has been widely studied for its efficacy in increasing hemoglobin levels is moringa leaf extract.

According to **table 2**, the significance value (2-tailed) was 0.001, which is less than 0.05. This indicates a statistically significant difference in hemoglobin levels before and after the administration of moringa extract. In other words, the administration of moringa leaf extract had a significant effect on increasing hemoglobin levels among postpartum women with anemia at Kuanfatu Public Health Center.

This study demonstrates a statistically significant increase in hemoglobin levels among postpartum women with anemia following administration of *Moringa oleifera* leaf extract. Mean hemoglobin rose from 8.657 g/dL before the intervention to 10.927 g/dL after ($p < 0.001$). These results align with prior evidence supporting *Moringa oleifera*'s efficacy in raising hemoglobin in reproductive-age women with anemia.

A quasi-experimental study conducted in Gujarat, India, found that daily supplementation with M. oleifera leaf powder capsules for seven days significantly increased postpartum hemoglobin from 10.9 ± 1.4 to 12.3 ± 1.5 g/dL in the intervention group—compared to 10.3 ± 1.5 to 11.6 ± 1.6 g/dL in controls ($p = 0.00001$) (Gandi, 2023). These findings closely mirror the hemoglobin improvements observed in the current study.

Likewise, a systematic review by Badri et al. (2024) reported that M. oleifera supplementation in anemic pregnant women produced significant hemoglobin increases over study periods varying from first to third trimester ($p < 0.05$). Furthermore, a quasi-experimental study in Indonesia (Tlogosari Wetan) comparing M. oleifera capsule plus iron supplementation versus iron tablets alone showed significantly higher mean hemoglobin (11.95 g/dL vs. 11.06 g/dL; $p < 0.05$) in the intervention group (Estiyani et al., 2017).

In addition, a randomized controlled trial among anemic female adolescents demonstrated that M. oleifera leaf supplementation increased hemoglobin significantly more than iron tablet therapy over 21 days (increase: 1.83 ± 0.99 g/dL vs. 1.40 ± 0.94 g/dL; $p = 0.039$) (Yulastini et al., 2023). This supports the modal consistency across various populations.

The correlation coefficient of 0.618 in this study indicates a strong positive association between pre- and post-intervention hemoglobin levels, reinforcing the consistency of moringa's effect. Reduction in post-test standard deviation further confirms the intervention's reliable impact.

Nevertheless, this study is limited by its quasi-experimental design, small sample size, and short observation period. Future studies should involve randomized controlled trials with larger cohorts, longer follow-up, and exploration of moringa supplementation in combination with standard iron protocols.

CONCLUSION

This study demonstrates that *Moringa oleifera* leaf extract has a significant positive effect on increasing hemoglobin levels among postpartum women with anemia. The intervention led to a statistically significant mean increase of 2.27 g/dL in hemoglobin levels (from 8.657 g/dL to 10.927 g/dL, $p < 0.001$), indicating its potential as an effective natural supplement during the postpartum period. The consistency of outcomes, supported by a strong positive correlation ($r = 0.618$) and reduced post-intervention variability, suggests that moringa supplementation can be reliably integrated into postpartum anemia management strategies. While the participants also received standard iron tablets, the addition of moringa extract appears to have enhanced recovery outcomes.

Based on the results of the study, it can be concluded that the administration of moringa leaf extract to postpartum women with anemia had a significant effect on increasing hemoglobin levels among postpartum women with anemia at Kuanfatu Public Health Center.

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Ethical Approval

Ethical approval was not required.

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Author Contributions

Conceptualization: J.A. Methodology: J.A. Data Collection: J.A. Data Analysis: J.A., R.Y.A. Writing – Original Draft: J.A. Writing – Review & Editing: J.A., Y.P. Resources: J.A. Supervision: R.Y.A., Y.P. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

Abbreviations

dL	deciliter
g	gram
Hb	Hemoglobin
mg	milligram
WHO	World Health Organization

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