

The Use of Local Guava Juice to Increase Hemoglobin Levels in Pregnant Women with Anemia

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ABSTRACT

Background & Objectives: Anemia in pregnant women is a global health issue, including in Indonesia, generally caused by iron deficiency due to increased nutritional needs during pregnancy. This condition can be exacerbated by other factors such as birth spacing, infections, and low adherence to iron supplementation. The administration of iron tablets as a preventive measure often faces obstacles, such as side effects and low adherence. Red guava juice is rich in vitamin C and has the potential to enhance iron absorption and hemoglobin levels in pregnant women. The use of local red guava juice aims to serve as an adjunct in increasing hemoglobin levels in anemic pregnant women. **Methods:** This nursing care intervention employed a case study approach and was conducted on two pregnant women with anemia. **Results:** The results showed that red guava juice administered over 7 days had an effect on both participants. The participant with anemia due to nutritional deficiency experienced an increase from 9.1 g/dL to 13.4 g/dL, with symptoms decreasing by day 3 and disappearing by day 5, while the respondent with anemia due to hereditary factors showed an increase from 10.2 g/dL to 11.1 g/dL, with symptoms decreasing by day 3 and disappearing by day 7. **Conclusion:** Red guava juice is effective as a supplement for increasing hemoglobin levels due to its high vitamin C content, which aids in iron absorption.

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Introduction

Anemia in pregnant women is a condition in which hemoglobin (Hb) levels are below normal, generally caused by iron deficiency (Sari et al., 2022). The World Health Organization (WHO) defines pregnancy anemia at Hb levels <11 g/dl and classifies it into mild, moderate, and severe anemia based on Hb levels (Mentari & Nugraha, 2023; Sari et al., 2022). Pregnancy anemia remains a global public health problem. Based on World Health Organization (WHO) data in 2023, 35.5% of pregnant women globally experience anemia, with a higher prevalence in the Southeast Asian region, namely 42.1% (WHO, 2025). The results of the Indonesian Health Survey (SKI) in 2023 showed that 27.7% of pregnant women experienced anemia (SKI, 2023). These data illustrate that anemia in pregnancy remains a serious problem that requires special attention (SKI, 2023). During pregnancy, there is an increase in blood volume known as hydremia or hypervolemia, where the increase in plasma volume is greater than the increase in the number of red blood cells (Melisa et al., 2021). This condition causes blood dilution (hemodilution), with an increase in plasma of about 30%, red blood cells of 18%, and hemoglobin of about 19%, so that pregnant women are vulnerable to anemia (Melisa et al., 2021).

Anemia in pregnant women is influenced by various interrelated factors. Nutritional deficiencies, particularly micronutrients such as iron and folate, are the main factors significantly associated with the incidence of anemia, which is often exacerbated by low dietary diversity and inadequate intake of iron-folate supplementation (Sufyaningsi et al., 2024). In addition, reproductive factors such as short birth spacing, maternal age, and blood loss during pregnancy also contribute to the occurrence of anemia (Sufyaningsi et al., 2024). Comorbidities in the form of infections, including malaria, intestinal parasites, and HIV, also increase the risk of anemia through increased nutritional needs and impaired nutrient absorption (Sufyaningsi et al., 2024). Socioeconomic factors and maternal education level play an important role in the incidence of anemia, because they influence knowledge, health behavior, and understanding of anemia prevention (Sufyaningsi et al., 2024).

Anemia in pregnant women has negative impacts on the health of both mother and fetus, including increasing the risk of bleeding, infection, prolonged labor, as well as premature birth, fetal growth disorders, and perinatal death (Sari et al., 2022). Although Fe tablet supplementation is the main effort for preventing anemia, adherence to consumption remains low due to side effects, so alternative interventions based on locally available foods that are easily accepted are needed (Krismawati et al., 2022). Guava has the potential to be a local food alternative in preventing anemia because of its vitamin C content and nutrients that support iron absorption and hemoglobin formation. Several studies show that consumption of guava juice is proven to significantly increase hemoglobin levels in pregnant women (Asiah & Utami, 2024; Melisa et al., 2021).

Objective

This study aims to determine the effectiveness of incorporating local guava juice into the diet for increasing hemoglobin levels in pregnant women with anemia.

Method

This nursing care intervention, using a case study approach, was conducted on two pregnant women with anemia. Both women were given red guava juice for 7 days

to increase their hemoglobin levels. The case study approach was applied to Mrs. S and Mrs. O for 7 days, from January 12, 2025, to January 18, 2025. Red guava juice, as a nonpharmacological supportive therapy, has the potential to increase hemoglobin levels due to its high vitamin C content, which plays a role in enhancing iron absorption by reducing Fe^{3+} to Fe^{2+} (Asiaah & Utami, 2024).

The author made daily visits to administer the guava juice and inquire about any symptoms experienced. The author measured Hb levels twice: on the first day before administering the guava juice and on the eighth day after administration. The guava juice administered to the clients consisted of 250 ml, made from 150 g of guava and 100 ml of water. The subjects in this study were Ms. S, aged 23 years, G3P2A0, 35 weeks' gestation, and Ms. O, aged 39 years, G4P3A0, 37 weeks' gestation. Data were collected through medical history interviews, physical examinations, testing, and record-keeping. The data were analyzed by comparing the findings with existing theories.

Results

On January 11, 2026, at 09:00 WIB, the researcher conducted hemoglobin (Hb) level examinations and assessments of signs and symptoms of anemia in clients Mrs. S and Mrs. O. The assessment results showed that Mrs. S complained of frequently experiencing dizziness and weakness, which were more pronounced when getting up from a sitting position and when doing activities or working. The client also stated that she easily felt tired even after resting, had a history of anemia since adolescence, had never consumed Fe tablets since adolescence, and had a family history of anemia from her mother's side.

Meanwhile, Mrs. O complained of dizziness that appeared especially when waking up from sleep, accompanied by weakness and easy fatigue, particularly when doing activities such as going up and down stairs. The client stated that she was not compliant with taking iron supplementation tablets because she felt uncomfortable in her stomach after consuming them. Observation results showed that both clients appeared to have anemic conjunctiva, with pale and weak-looking faces. Hb level examination showed values of 10.4 g/dL in Mrs. S and 9.1 g/dL in Mrs. O, indicating anemia.

Based on these assessment results, the researcher then planned a non-pharmacological intervention in the form of serving red guava juice to the patients as a supportive effort to increase hemoglobin and reduce the complaints felt by the clients. This intervention was chosen because red guava is known to contain a lot of vitamin C, which is important for iron absorption.

On January 12, 2026, at 09:00 WIB, the researcher began the intervention by providing 250 ml of red guava juice consisting of 150 grams of red guava and 100 ml of mineral water. On the first day of intervention, Mrs. S complained of still experiencing dizziness, slight weakness, and aching pain in the waist and legs. The client expressed her willingness to routinely consume guava juice and increase intake of iron-rich foods, as well as understand the importance of doing activities gradually.

Mrs. O on the same day still complained of spinning dizziness especially when getting up from sitting or sleeping, accompanied by weakness and fatigue. The client expressed commitment to consuming guava juice and iron-rich foods, doing activities gradually, and being careful when going up and down stairs. Observation results showed Mrs. S appeared tired during the interview, while Mrs. O appeared weak.

Both clients agreed to routine consumption of red guava juice and iron-rich foods such as spinach, and appeared to consume the juice on the first day.

On January 13, 2026, at 08:00 WIB, the intervention of providing guava juice with the same composition was carried out again. Mrs. S reported that the feeling of easy fatigue began to decrease, although dizziness was still felt but with less frequency. Weakness also decreased, and the client began to change body position slowly. Mrs. O also conveyed that dizziness and weakness were still present, but not as often as before. Observation showed both clients appeared fresher and consumed guava juice on the second day.

On January 14, 2026, at 08:00 WIB, Mrs. S stated that dizziness was felt less frequently and weakness complaints decreased although they still appeared during activity. Mrs. O also reported increasingly infrequent dizziness and a decrease in weakness. Observation results showed Mrs. S appeared fresher and Mrs. O appeared fit, and both consumed guava juice on the third day.

On January 15, 2026, at 09:00 WIB, Mrs. S conveyed that dizziness only appeared when doing excessive activity, fatigue decreased compared to previous days, and the body felt fresher when waking up. Mrs. O reported no longer feeling dizzy, although still feeling mild weakness, and adequate sleep quality. Observation showed Mrs. S appeared fresher and more energetic with daily activities that could be done well, while Mrs. O also appeared fresh and made position changes slowly. Both clients finished the guava juice on the fourth day.

On January 16, 2026, at 09:00 WIB, Mrs. S stated she no longer felt dizzy and felt more energetic, although occasionally still easily tired. The client also conveyed that although her sleep was still interrupted, her body felt fresher when waking up in the morning. Mrs. O stated she did not feel dizzy and her sleep was adequate. Observation results showed both clients appeared fresh, not pale, and consumed guava juice on the fifth day.

On January 17, 2026, at 10:00 WIB, Mrs. S reported not experiencing dizziness, sleeping adequately, and waking up in a fresh condition, although occasionally still feeling quickly tired but much improved. Mrs. O also stated she did not feel dizzy and had good sleep quality. Observation showed both clients appeared fresher and finished the guava juice on the sixth day.

On January 18, 2026, at 09:00 WIB, Mrs. S stated she no longer experienced dizziness, felt much fitter, and had not felt fatigue since the previous day. Mrs. O also reported not feeling dizzy and sleeping adequately. Observation results showed both clients appeared fresh and not pale. The clients agreed to continue consuming guava juice and iron-rich foods independently. Guava juice was consumed on the seventh day.

On January 19, 2026, at 09:00 WIB, the researcher ended the guava juice intervention. Mrs. S and Mrs. O stated they no longer felt dizzy or weak. Final Hb examination results showed an increase in Hb levels in Mrs. S to 11.1 g/dL and in Mrs. O to 13.4 g/dL. The analysis showed that Mrs. S experienced a gradual decrease in symptoms with improvement beginning to be seen on the third day and disappearing completely on the seventh day. In Mrs. O, the decrease in symptoms occurred more quickly, with improvement starting on the third day and complaints no longer felt on the fifth day. These findings indicate that the provision of guava juice as a supportive intervention provided benefits in increasing hemoglobin in both pregnant patients.

Discussion

After the administration of guava juice for seven days, there was an increase in hemoglobin in both pregnant women. This finding is in line with the findings of Melisa et al. (2021), who reported that consumption of guava juice combined with Fe tablets within seven days increased the average hemoglobin of pregnant women from 9.72 g/dL to 11.13 g/dL (Melisa et al., 2021). Similar findings were also reported by Asiah and Utami (2024), which showed that guava juice intake contributed to increasing hemoglobin by up to 1.8 g/dL within seven days (Asiah & Utami, 2024). The similarity in results shows that the provision of local foods rich in vitamin C has potential as a supportive therapy in increasing hemoglobin levels in pregnant women.

In this case study, the increase in Hb levels after the intervention was recorded at 0.9 g/dL in Mrs. S and 4.3 g/dL in Mrs. O. This difference in response indicates individual variation toward the intervention given. The greater increase in Mrs. O is likely related to the absence of a previous history of anemia, while Mrs. S had a history of anemia that could potentially affect the physiological response to increased hemoglobin levels. This variation in response can be influenced by genetic factors, iron absorption capacity, and daily nutritional intake conditions (Wahyuni, 2024).

The long-term history of anemia in Mrs. S may indicate a chronic disturbance in iron metabolism. This condition has the potential to cause the hemoglobin level increase response to be slower compared to individuals without a history of anemia. This difference emphasizes that the effectiveness of nutritional intervention is not merely determined by the intervention group but also depends on the individual's basic physiological condition (Wahyuni, 2024).

Biologically, iron deficiency anemia can be influenced by genetic factors that play a role in regulating systemic iron homeostasis and the absorption process in the intestine. The *TMPRSS6* gene plays a role in regulating hepcidin, while the *SLC11A2* gene plays a role in the iron absorption process in the duodenum (Wahyuni, 2024). Under normal conditions, hepcidin functions to maintain the body's iron balance through regulating iron absorption from the intestine and iron release from body stores (Wahyuni, 2024). Disturbances in the *TMPRSS6* gene can cause hepcidin regulation to become suboptimal, thereby inhibiting the process of effectively utilizing iron (Wahyuni, 2024).

One manifestation of this disturbance is IRIDA (Iron Refractory Iron Deficiency Anemia), which is a condition of anemia due to a defect in the *TMPRSS6* gene that encodes the matriptase-2 protein, which functions to reduce hepcidin expression (Wahyuni, 2024). In this condition, hepcidin levels remain high even though the body experiences iron deficiency (Wahyuni, 2024). High hepcidin will inhibit iron absorption in the intestine and inhibit iron release from body stores, thereby causing persistent iron deficiency (Wahyuni, 2024). This mechanism can explain the slow increase in hemoglobin levels in individuals with a long-term history of anemia such as Mrs. S.

In addition to genetic factors, hepcidin regulation is also influenced by inflammatory conditions (Wahyuni, 2024). When inflammation occurs, hepcidin levels increase, thereby inhibiting iron absorption even though nutritional intake is sufficient (Wahyuni, 2024). Conversely, in conditions of iron deficiency, hepcidin levels decrease to increase the absorption and distribution of iron into the plasma (Wahyuni, 2024). This mechanism shows that the balance of hepcidin plays an important role in determining the success of iron improvement therapy, both through

supplementation and non-pharmacological interventions such as consumption of red guava juice.

In addition to physiological and genetic factors, the difference in response of the two respondents was also influenced by obstetric factors, particularly pregnancy spacing. Mrs. O had a pregnancy spacing of four years, allowing the body to have the opportunity to recover its nutritional reserves, including iron. Conversely, Mrs. S had a pregnancy spacing of less than one year, which could potentially cause iron reserves to not recover optimally. Research by Hassen et al. (2024) and Putri and Fauzia (2022) showed that a pregnancy interval of less than 24 months significantly increases the risk of anemia in pregnant women and impacts less optimal pregnancy outcomes (Sudarmi et al., 2025).

A pregnancy interval that is too short limits the time for recovery of iron reserves after a previous pregnancy and breastfeeding (Sudarmi et al., 2025). As a result, mothers are more vulnerable to experiencing iron deficiency in the next pregnancy, which can worsen anemia or slow down the recovery of hemoglobin levels even though nutritional intervention has been carried out (Sudarmi et al., 2025).

The age of pregnant women also affects the risk of anemia. Pregnant women under 20 years of age have higher nutritional needs because they are still in a period of growth and often have low levels of adherence to Fe tablet consumption. Conversely, at ages >35 years, there is a decline in physiological function and the ability of organs to produce hemoglobin. Research by Sari et al. shows that the age groups <20 years and >35 years have a higher risk of anemia compared to the healthy reproductive age of 20–35 years.

Adherence to Fe tablet consumption is an important factor in maintaining hemoglobin levels ≥ 11 g/dL. The government recommends that pregnant women consume at least 90 Fe tablets during pregnancy at a dose of one tablet per day (Imas & Nency, 2022). Fe tablets contain 60 mg of iron and 0.25 mg of folic acid, which play a role in meeting the increased iron needs during pregnancy and supporting the erythropoiesis process.

Non-pharmacological interventions such as consumption of red guava juice can be an effective additional therapy because its high vitamin C content can increase non-heme iron absorption (Devi et al., 2024). Iron absorption is also influenced by a balanced diet that includes heme and non-heme iron sources as well as a combination of vitamin C at the same time of consumption (Kemenkes, 2023; Lina et al., 2024).

Kemenkes (2023) recommends the implementation of balanced nutrition through four pillars, namely diverse food consumption, clean living behavior, physical activity, and regular weight monitoring. Heme iron from animal sources is more easily absorbed than non-heme iron from plant sources, and combining it with vitamin C in one meal can increase iron bioavailability (Kemenkes, 2023).

The impacts of anemia on pregnant women include decreased oxygen supply to body tissues, including muscles and the nervous system, thereby causing fatigue, sleep disturbances, and stress that affect physiological adaptation during pregnancy (Fajarwati, 2025). In addition, consuming sweet tea after meals can inhibit iron absorption, while drinks high in vitamin C such as guava juice can increase iron absorption (Lisisina et al., 2021).

The limitation in this study is that other supporting laboratory examinations such as serum ferritin, hematocrit, and inflammatory status markers were not carried out. The assessment of anemia conditions in respondents was only based on

hemoglobin levels, so the researcher's ability to determine the type of anemia and the degree of iron deficiency more specifically was limited. Serum ferritin examination plays an important role in assessing the body's iron reserves, while hematocrit and inflammatory markers are needed to distinguish pure iron deficiency anemia from anemia due to inflammatory processes or other conditions.

Conclusion

The results of the study showed an increase in hemoglobin levels in both pregnant women with anemia, accompanied by a gradual reduction and disappearance of signs and symptoms. This indicates that the application of local food in the form of guava juice in increasing hemoglobin in pregnant women with anemia is effective as a companion therapy for anemia in increasing hemoglobin levels in pregnant women. Due to the limitations in this study, namely the absence of other supporting laboratory examinations such as ferritin, hematocrit, and inflammatory status markers, it is hoped that future research can carry out these examinations to strengthen and support the results obtained.

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