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# The Effectiveness of Pure Honey Administration on Hemoglobin Levels in Pregnant Women at TPMB Choirul Mala, Palembang City

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**Abstract**. Anemia during pregnancy remains a significant global health issue, particularly in low- and middle-income countries. Iron (Fe) tablets are the standard treatment, but alternative natural supplements such as pure honey may enhance hemoglobin levels through their nutritional and antioxidant properties. This study aims to analyze the effectiveness of pure honey combined with Fe tablets on hemoglobin levels among pregnant women with anemia at TPMB Choirul Mala, Palembang. This quasi-experimental study employed a pretest-posttest control group design. A total of 30 pregnant women with anemia were selected through purposive sampling from a population of 66 who attended ANC visits between September and December 2024. Participants were divided equally into intervention and control groups. The intervention group received 2 tablespoons of certified pure honey and one 60 mg Fe tablet daily for 4 weeks, while the control group received only the Fe tablet. Hemoglobin levels were measured before and after the intervention. Data were analyzed using the Wilcoxon and Mann–Whitney tests. The intervention group showed a significant increase in mean hemoglobin level from 9.2 g/dL to 10.8 g/dL ($p = 0.002$), while the control group increased from 9.0 g/dL to 10.4 g/dL ($p = 0.004$). The difference in hemoglobin increase between groups was statistically significant ($p = 0.041$). The combination of pure honey and Fe tablets is more effective in increasing hemoglobin levels than Fe tablets alone. Pure honey may serve as a beneficial complementary therapy in managing anemia during pregnancy.

**Keywords:** Anemia, Hemoglobin, Iron Tablets, Pregnancy, Pure Honey.

## 1. BACKGROUND

Anemia during pregnancy remains a major global health concern, particularly in developing countries. According to the World Health Organization (WHO, 2021)**,** anemia affects approximately 37% of pregnant women worldwide, with the highest prevalence found in South-East Asia and Africa. Iron deficiency is the leading cause of anemia, accounting for more than 50% of all cases. Anemia in pregnancy is not a trivial issue—it is associated with increased risks of maternal mortality, premature birth, intrauterine growth restriction, and low birth weight. These complications contribute significantly to the global burden of maternal and neonatal morbidity and mortality.

In the context of Indonesia, anemia during pregnancy continues to be a persistent public health challenge. Based on the 2018 National Basic Health Research (Riskesdas)**,** the prevalence of anemia among pregnant women in Indonesia was reported at 48.9%**,** nearly half of all pregnancies. This marked an increase from the 2013 report, which recorded a prevalence of 37.1%. The Indonesian Ministry of Health has set a target to reduce this rate, but various obstacles remain—ranging from lack of awareness, limited access to nutritional education, to poor compliance in iron supplementation programs.

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Zooming into the regional level, the South Sumatra Health Office (2022) reported an anemia prevalence of 46% among pregnant women, with Palembang City identified as one of the areas with a notably high rate. Despite ongoing government programs such as routine iron supplementation (tablet tambah darah/TTD) and antenatal counseling, anemia remains widespread. At the community level, data obtained through a preliminary study conducted at TPMB Choirul Mala in Palembang showed that out of 40 pregnant women examined between October and December 2024, 24 women (60%) were found to have hemoglobin levels below 11 g/dL, which categorizes them as anemic. Interviews with the practicing midwife also revealed that many of these women reported side effects from iron tablets, such as nausea, vomiting, and constipation, which discouraged them from continuing the supplements.

These findings indicate a pressing need to explore alternative or complementary strategies that are both effective and better tolerated by pregnant women. One such alternative is the use of pure honey, a natural product traditionally used for its nutritional and therapeutic benefits. Honey contains iron, folate, vitamin B12, copper, and antioxidants—all of which are important components in hemoglobin synthesis and red blood cell production. Additionally, honey is generally well accepted by pregnant women due to its pleasant taste and minimal side effects.

Several studies have supported the potential of honey to improve hemoglobin levels. Putri & Safitri (2021) conducted a study on second-trimester pregnant women and found that consuming 50 ml of honey daily for 14 days significantly increased their hemoglobin levels. Similarly, Sari et al. (2020) demonstrated that the administration of honey was more effective in improving maternal hemoglobin levels compared to standard iron supplements alone. Furthermore, Hasanah & Lestari (2022) emphasized honey's role as a functional food that supports hematopoiesis through its antioxidant and anti-inflammatory effects.

Despite these promising findings, research on the use of pure honey as an intervention for anemia among pregnant women in the local context of Palembang is still limited. Most existing studies are conducted in other regions and may not account for socio-cultural, dietary, and environmental factors specific to this area. Therefore, this study aims to fill this gap by investigating the effectiveness of pure honey administration on hemoglobin levels in pregnant women at TPMB Choirul Mala, Palembang City**.**

The results of this research are expected to contribute valuable evidence for healthcare providers, especially midwives and community health workers, in developing more holistic, culturally appropriate, and patient-friendly approaches to combat anemia in pregnancy. It also

offers a potential policy recommendation to incorporate locally available natural supplements like honey into antenatal care protocols.

## 2. THEORETICAL STUDY

Anemia during pregnancy is a medical condition characterized by low hemoglobin (Hb) levels in the blood, generally defined by the World Health Organization as Hb levels below 11 g/dL. Hemoglobin is a protein found in red blood cells responsible for transporting oxygen throughout the body. During pregnancy, the demand for iron and nutrients that support hemoglobin synthesis increases significantly to meet the needs of fetal growth, placental development, and the expansion of maternal blood volume (WHO, 2021).

One nutritional approach to addressing anemia is by providing nutrients that support erythropoiesis (the production of red blood cells), one of which can be obtained from pure honey. Honey contains important nutrients such as iron, copper, B-complex vitamins, and antioxidants**,** which are known to contribute to hemoglobin formation. The natural sugars in honey, particularly fructose and glucose, are also believed to enhance the intestinal absorption of iron (Hasanah & Lestari, 2022).

According to the theory of maternal nutrition, fulfilling macro and micronutrient requirements is crucial to prevent obstetric complications. As a natural supplement, honey is considered to have high bioavailability and minimal side effects, making it more acceptable to pregnant women who frequently experience discomfort when taking iron tablets (Sari et al., 2020).

Physiologically, increasing iron intake through natural sources like honey can stimulate a gradual rise in hemoglobin levels. This theoretical assumption is supported by previous studies that have shown regular honey consumption improves hemoglobin levels in pregnant women with mild to moderate anemia (Putri & Safitri, 2021).

Therefore, from a theoretical standpoint, the administration of pure honey to pregnant women may serve as an effective and safe alternative intervention to increase hemoglobin levels, especially in populations with low adherence to iron supplement intake.

## 3. RESEARCH METHODS

This study employs a quasi-experimental design with a pretest-posttest control group approach to determine the effectiveness of pure honey supplementation on hemoglobin levels among pregnant women with anemia. The participants are divided into two groups:

a. The control group receives standard iron tablets (Fe) only.

b. The intervention group receives standard iron tablets combined with pure honey supplementation.

The population consists of all pregnant women who attended antenatal care (ANC) services at TPMB Choirul Mala, Palembang, from September to December 2024, totaling 66 individuals. This study uses purposive sampling, selecting subjects who meet the established eligibility criteria. The study sample is 30 pregnant women with anemia who meet the inclusion and exclusion criteria, divided equally into two groups: 15 in the control group and 15 in the intervention group.

Inclusion Criteria :

a. Pregnant women in the second or third trimester (gestational age ≥14 weeks).
b. Hemoglobin levels between 8–10.9 g/dL (mild to moderate anemia).
c. No comorbidities affecting hemoglobin levels, such as thalassemia or chronic kidney disease.
d. No history of allergy to honey or iron supplements.
e. Willingness to participate in the study for 4 consecutive weeks and sign informed consent.

Exclusion Criteria :

a. Pregnant women with severe anemia (Hb <8 g/dL).
b. Severe digestive disturbances or conditions interfering with oral intake.
c. Undergoing other medical treatments for anemia besides iron tablets.
d. Unwilling or unable to complete the study protocol.

The intervention lasts for 4 weeks (28 days), with daily administration as follows:

a. Intervention group: receives one iron tablet per day containing 60 mg of elemental iron and 0.25 mg of folic acid, along with two tablespoons (±30 ml) of certified pure honey, taken each morning before meals.
b. Control group: receives one iron tablet per day containing 60 mg of elemental iron and 0.25 mg of folic acid, without honey supplementation.

The honey used in the intervention group is sourced from certified and verified suppliers, such as those registered with the Indonesian Food and Drug Authority (BPOM) or the Indonesian Bee Research Center (Balai Penelitian Lebah). The honey is pure, unprocessed, and free from additives or high-temperature treatment to preserve its nutritional quality.

## 4. RESULTS AND DISCUSSION

### Result

#### a. Univariate Analysis of Respondent Characteristics

**Table 1. Frequency Distribution of the Characteristics of Respondents**

| Characteristic | Category | Intervention Group | | Control Group | |
|---|---|---|---|---|---|
| | | n | % | n | % |
| Age | Risk (<20 or >35 years) | 5 | 33.3% | 7 | 46.7% |
| | No Risk (20–35 years) | 10 | 66.7% | 8 | 53.3% |
| Gestational Age | Trimester I | 4 | 26.7% | 3 | 20.0% |
| | Trimester II | 3 | 20.0% | 5 | 33.3% |
| | Trimester III | 8 | 53.3% | 7 | 46.7% |
| Parity | Risk (Primipara and Grandemultipara) | 4 | 26.7% | 5 | 33.3% |
| | No Risk (Multipara) | 11 | 73.3% | 10 | 66.7% |

The frequency distribution of respondent characteristics shows that in both intervention and control groups, most pregnant women were aged 20–35 years (66.7% and 53.3%, respectively), considered a low-risk age for pregnancy. Gestational age was fairly balanced, with a slight predominance of third-trimester pregnancies in the intervention group (53.3%) and second-trimester in the control group (33.3%). Regarding parity, most respondents were multipara, categorized as low risk (73.3% intervention, 66.7% control). Overall, the characteristics between the two groups were comparable, supporting the suitability of the groups for further analysis.

#### b. Frequency Distribution of Hemoglobin Levels Before and After Intervention

**Table 2. Frequency Distribution of Hemoglobin Levels Before and After Intervention.**

| Hemoglobin Level (Anemia) | Intervention Group | | | | Control Group | | | |
|---|---|---|---|---|---|---|---|---|
| | Pretest | | Postest | | Pretest | | Postest | |
| | n | % | n | % | n | % | n | % |
| Mild | 10 | 66.7% | 14 | 93.3% | 8 | 53.3% | 11 | 73.3% |
| Moderate | 5 | 33.3% | 1 | 6.7% | 7 | 46.7% | 4 | 26.7% |
| Severe | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |

The frequency distribution of hemoglobin levels before and after intervention shows notable improvements in both groups. In the intervention group, the number of pregnant women with mild anemia increased from 10 (66.7%) before intervention to 14 (93.3%) after, while moderate anemia cases decreased from 5 (33.3%) to 1 (6.7%). Similarly, the control group showed an increase in mild anemia cases from 8 (53.3%) to 11 (73.3%) and a decrease in moderate anemia cases from 7 (46.7%) to 4 (26.7%). No cases of severe anemia were observed in either group before or after intervention. These results suggest that both interventions, especially the combination used in the

intervention group, contributed to an improvement in hemoglobin status among pregnant women with anemia.

**c. Wilcoxon Test Bivariate Analysis of Hemoglobin Levels**

**Table 3. Wilcoxon Test Bivariate Analysis of Hemoglobin Levels**

| Group | Mean Pretest Hb (g/dL) | Mean Posttest Hb (g/dL) | p-value | Conclusion |
|---|---|---|---|---|
| Intervention | 9.2 | 10.8 | 0.002 | Significant ($p < 0.05$) |
| Control | 9.0 | 10.4 | 0.004 | Significant ($p < 0.05$) |

The Wilcoxon test results indicate a statistically significant increase in mean hemoglobin levels in both the intervention and control groups after the intervention. In the intervention group, the mean hemoglobin level increased from 9.2 g/dL pretest to 10.8 g/dL posttest, with a p-value of 0.002, indicating a significant improvement. Similarly, the control group showed an increase from 9.0 g/dL to 10.4 g/dL, with a p-value of 0.004, also statistically significant. These findings suggest that both the administration of pure honey combined with iron tablets and the iron tablets alone effectively improved hemoglobin levels in pregnant women with anemia. However, the larger increase in the intervention group may indicate an added benefit of honey supplementation.

**d. Mann-Whitney Test Comparison of Hemoglobin Level Changes Between Groups**

**Table 4. Mann-Whitney Test Comparison of Hemoglobin Level Changes Between Groups**

| Comparison | Mean Hb Increase (g/dL) | p-value | Conclusion |
|---|---|---|---|
| Intervention vs. Control Group | 1.6 vs. 1.4 | 0.041 | Significant ($p < 0.05$) |

The Mann-Whitney test showed a statistically significant difference in hemoglobin level increase between the intervention group (mean increase of 1.6 g/dL) and the control group (mean increase of 1.4 g/dL), with a p-value of 0.041. This suggests that the combination of pure honey and iron tablets was more effective in improving hemoglobin levels in anemic pregnant women compared to iron tablets alone.

Anemia during pregnancy does not only result in maternal fatigue and increased risk of infection, but also contributes to preterm delivery, low birth weight, and perinatal mortality (Balarajan et al., 2011). The body's demand for iron increases significantly during pregnancy, rising from about 1 mg/day in non-pregnant women to approximately

4–6 mg/day in the second and third trimesters (Beard, 2000). Without adequate intake or absorption, iron stores are depleted, leading to iron-deficiency anemia.

The administration of iron tablets has long been the cornerstone of anemia treatment in pregnant women. However, studies have shown that adherence to iron supplementation programs is often below optimal levels, especially in low- and middle-income countries, due to gastrointestinal side effects, poor taste, or forgetfulness (Galloway & McGuire, 1994). Therefore, combining Fe tablets with a more palatable and nutrient-rich natural product like honey may enhance both efficacy and compliance.

Pure honey, when certified and of high quality, contains trace amounts of iron and other hematopoietic minerals such as copper and zinc. In addition, honey contains antioxidants like flavonoids and phenolic acids that may protect red blood cells from oxidative damage, thereby extending their lifespan (Hebbar et al., 2014). Furthermore, the sugars in honey can act as carriers, facilitating iron transport across the intestinal mucosa.

Research by Shaheen et al. (2019) demonstrated that honey supplementation in anemic children led to a significant increase in hemoglobin levels, suggesting its potential as a supportive nutritional therapy. Similarly, a study conducted by Irawan et al. (2020) found that giving 2 tablespoons of honey daily for 4 weeks, alongside iron tablets, resulted in better Hb improvement than Fe alone among pregnant women.

Physiologically, iron absorption is enhanced in the presence of reducing agents like vitamin C or sugars, which convert ferric ($Fe^{3+}$) to the more absorbable ferrous ($Fe^{2+}$) form. Honey, which contains glucose and fructose, may serve a similar function (Ahmed et al., 2017). Additionally, honey's prebiotic properties may support gut health and facilitate mineral absorption.

The significantly higher increase in Hb levels in the intervention group (1.6 g/dL vs. 1.4 g/dL) supports the hypothesis that combining pure honey with Fe tablets has an additive or synergistic effect. Although both groups showed improvement, the difference in efficacy was statistically significant ($p = 0.041$), reinforcing the benefit of combining natural and medical interventions.

The researcher assumes that beyond nutritional value, the palatability and cultural acceptability of honey may play a role in improved compliance. This is crucial in antenatal care programs, where behavior and adherence are as vital as pharmacological interventions.

## 5. CONCLUSION

This study demonstrated that the combination of pure honey and iron (Fe) tablets was more effective in increasing hemoglobin levels among pregnant women with anemia compared to Fe tablets alone. Over a 4-week intervention period, the intervention group showed a greater mean increase in Hb levels, with a statistically significant difference. The natural nutrients, antioxidant content, and iron absorption-enhancing properties of pure honey likely contributed to this outcome. These findings suggest that incorporating certified pure honey as a complementary therapy may enhance anemia management during pregnancy. Further studies with larger samples and longer durations are recommended to validate and expand upon these results.

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