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The Effect Of Iron Supplement Consumption On HB Levels In Pregnant Women At The Bangko Jaya Community Health Center, Rokan Hilir Regency

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Abstract

Iron deficiency anemia in pregnant women is a serious health problem in Indonesia with a prevalence of 27.7%, mainly due to low compliance with iron supplement consumption despite the implementation of the Iron Supplement Tablet (TTD) program. This study aims to analyze the relationship between compliance with iron supplement consumption and hemoglobin (Hb) levels in pregnant women at the Bangko Jaya Community Health Center, Rokan Hilir Regency. Using a quantitative descriptive cross-sectional design, a population of 85 pregnant women in the second and third trimesters was taken by total sampling. Instruments in the form of a compliance questionnaire and Hb data from medical records were analyzed univariately (frequency) and bivariately (Chi-Square). The results showed that 69.4% of respondents were compliant with supplement consumption, 68.2% were not anemic, with a significant relationship (p=0.00; OR=0.17, 95% CI: 0.02-1.18). It was concluded that compliance with iron supplement consumption was significantly associated with Hb levels in pregnant women, recommending strengthening ANC counseling.

Keywords: Anemia, Compliance, Hemoglobin, Iron Supplementation, Pregnancy.

INTRODUCTION

Pregnancy marks a period of significant physiological changes in a woman's body, with increased nutritional needs, particularly iron, which is essential for hemoglobin formation and oxygen transport to the fetus and placenta (WHO, 2024; Wulandari, 2020). Iron deficiency can trigger iron deficiency anemia, a common condition in developing countries like Indonesia, where approximately 35.5% of pregnant women globally and 27.7% in Indonesia experience it according to the Indonesian Health Survey (SKI, 2023; Frontiers in Global Women's Health, 2024). Iron needs increase due to blood volume expansion, fetal growth, and preparation for labor, often not met by dietary intake alone (CDC, 2018; Said, 2021).

Local data reinforces this phenomenon, such as in Riau Province in 2024, where 10.62% of pregnant women were anemic out of 49,790 examinations, and in Rokan Hilir Regency in 2023, reaching 2,635 cases out of 19,743 pregnant women (Dinkes Rohil, 2023; Muthia et al., 2022). A study at the Simpang Empat Health Center in 2024 showed that 68.8% of pregnant women were non-compliant with iron supplementation (TTD) consumption, correlating with high anemia (Selviana et al., 2024; Ministry of Health of the Republic of Indonesia, 2023). This condition threatens the national program to reduce maternal mortality and stunting by increasing the risk of postpartum hemorrhage and low birth weight (WHO, 2020; Wulandari & Fitriani, 2022).

The main problem lies in low compliance with iron supplement consumption, despite the government's recommended iron supplement program (TTD) of 90 tablets during pregnancy. Studies show that only 40-60% of mothers comply due to side effects such as nausea and constipation (Oktaviani et al., 2021; Wulandari & Fatmasari, 2020). At the Klungkung II Community Health Center, 73.1% of mothers were non-compliant, increasing the risk of anemia 11.4 times compared to those who complied (Omasti et al., 2022; Kusumasari et al., 2021). A preliminary study at the Bangko Jaya Community Health Center in July 2025 found that of 85 pregnant women, 70% did not regularly take iron supplements due to nausea, reflecting a gap in policy implementation (Yunika, 2021; Mufidah et al., 2018).

A significant relationship between adherence and anemia was demonstrated in a study at the Pauh Community Health Center (p=0.001) and in the second-third trimester by Imam et al. (p=0.001 for adherence, p=0.028 for nutritional status) (Choirunnisa, 2020; Fathoni, 2021). Compliance is measured by the amount, method, and frequency of consumption, crucial in the second-third trimester for preparation for childbirth (Devira, 2020; Fathoni et al., 2021). This low compliance hinders the prevention of serious impacts such as prematurity and fetal cognitive impairment, requiring appropriate interventions in the field (WHO, 2024; Indonesian Ministry of Health, 2023).

This study aims to analyze the level of compliance of pregnant women with iron supplement consumption at the Bangko Jaya Community Health Center, Rokan Hilir Regency, to identify inhibiting factors and contextual solutions. The urgency is pressing given that local data from July 2025 showed 70% non-compliance among 85 pregnant women, potentially worsening the 10.62% anemia prevalence in Riau and supporting the national target of reducing maternal and infant mortality rates (MMR), infant mortality rates (IMR), and stunting (SKI, 2023; Rohil Health Office, 2023). Its novelty lies in the specific study in this region with a mixed-methods approach following the 2025 preliminary study, complementing previous literature focused on other community health centers, thus contributing to local evidence-based ANC strategies (Selviana et al., 2024; Omasti et al., 2022).

RESEARCH METHODS

Types and Methods of Research

This study used a quantitative approach with a descriptive and cross-sectional design to identify the relationship between iron supplement compliance and hemoglobin (Hb) levels in pregnant women at the Bangko Jaya Community Health Center, Rokan Hilir Regency. The cross-sectional design was chosen because it allows for simultaneous data collection at a specific point in time, making it efficient for analyzing prevalence and variable associations without long-term interventions (Sugiyono, 2021; Creswell & Creswell, 2023). This approach aligns with similar studies exploring risk factors for anemia in pregnant women, where data on compliance and Hb status were collected simultaneously to avoid temporal bias (Kusumasari et al., 2021; Selviana et al., 2024).

Data Analysis Instruments and Techniques

The main research instrument was a questionnaire designed to measure iron supplement compliance based on the accuracy of the number, method, and frequency of tablets per day, as well as Hb level data from medical records. The questionnaire was validated through validity and reliability tests to ensure measurement accuracy, in line with quantitative instrument standards that emphasize the reliability of primary data (Emzir, 2022; Sudaryono, 2021). Data analysis included univariate analysis for the frequency distribution of compliance and anemia status, and bivariate analysis using the Chi-Square test to test for associations, with a p-value ≤ 0.05 as the significance threshold and an Odds Ratio (OR) calculation for the strength of the association (Sugiyono, 2021; Oktaviani et al., 2021).

Population and Sample

The study population included all 85 pregnant women registered at the Bangko Jaya Community Health Center (Puskesmas) in July 2025. The sampling technique used was a total sampling technique involving all members of the population who met inclusion criteria, such as second-third trimester gestation, no medical contraindications, and exclusion criteria such as those with hemolytic anemia or acute bleeding. This technique was chosen to avoid selection bias and maximize representation of small populations, as recommended in quantitative descriptive research in primary health facilities (Creswell & Creswell, 2023; Omasti et al., 2022). The sample selection ensured limited but accurate generalization to local conditions, consistent with previous studies in Indonesian community health centers (Selviana et al., 2024; Fathoni, 2021).

Research Procedures

The procedure began with ethical approval, followed by primary data collection through structured interviews using questionnaires with respondents who signed informed consent, and Hb data extraction from the Bangko Jaya Community Health Center medical records. Data were processed using statistical software for univariate (frequency and percentage) and bivariate (Chi-Square with OR 95% CI) analyses, with re-verification to reduce entry errors, following standard cross-sectional research protocols (Emzir, 2022; Sudaryono, 2021). The entire process was conducted between July and August 2025, ensuring confidentiality and ethical compliance in accordance with the guidelines of the Indonesian Ministry of Health (Indonesian Ministry of Health, 2023; Muthia et al., 2022).

RESULTS AND DISCUSSION

Table 1. Frequency Distribution of Respondents Based on Compliance with Iron Supplement Consumption at Bangko Jaya Community Health Center

No	Compliance	Frequency	Percentage
1	Obedient	59	69.4%
2	Not obey	26	30.6%
	Amount	85	100%

Source: Primary Data Analysis

Based on table 1, it is known that of the 85 respondents, the majority of respondents who complied with consuming iron supplements were 59 people (69.4%).

Table 2. Frequency Distribution of Respondents based on Anemia At Bangko Jaya Community Health Center

No	Anemia	Frequency	Percentage
1	Anemia	27	31.8%
2	No Anemia	58	68.2%
	Amount	85	100%

Source: Primary Data Analysis

Based on table 2, it is known that of the 85 respondents, the majority of respondents who were not anemic were 58 people (68.2%).

Table 3. Compliance of Iron Supplement Consumption with Respect to Iron Levels HB Pregnant Women at Bangko Jaya Health Center

Compliance of Pregnant Women	Anemia				Amount		P Value	OR *(95% CI)*
	Anemia		No Anemia					
	n	%	n	%	n	%		
Obedient	1	3.7	58	100	59	69.4		017
Not obey	26	96.3	0	0	26	30.6	0.00	(002-118)
Total	27	31.8	58	68.2	85	100		

Based on Table 3, information was obtained that among the 27 respondents who stated that they were compliant with consuming iron supplements, there was 1 respondent (3.7%), and those with anemia status were 26 respondents (96.3%). Among the 58 respondents who were not compliant with consuming iron supplements, there were 58 respondents (100%), and those who were not anemic were 0 (0%).to get no anemia. The results of the chi-square statistical test obtained p = 0.00 ($p \leq 0.05$) meaning Ha is accepted. It can be concluded that there is a relationship between compliance with iron supplement consumption and Hb levels of pregnant women at the Bangko Jaya Community Health Center. The OR value obtained is 0.17, meaning that compliance with iron supplement consumption has a 0.17 times chance of getting no anemia compared to non-compliance with iron supplement consumption.

DISCUSSION

Compliance

Based on the research results, it was found that of the 85 respondents, the majority of respondents who complied with consuming iron supplements were 59 people (69.4%).Based on the Integrated Antenatal Care Guidelines, Third Edition of the Indonesian Ministry of Health (2020), the minimum integrated antenatal care standard (12T) includes the provision of at least 90 iron supplements during pregnancy. The technical specifications for iron supplements are round/oval dark red sugar-coated tablets. Packaging in sachets, blisters, strips, and bottles should be in proportion to the tablet's contents. The packaging must guarantee the stability and quality of iron supplements for women of childbearing age and pregnant women. Each tablet should contain at least 60 mg of elemental iron (in the form of ferrous sulfate, ferrous fumarate, or ferrous gluconate) and 0.400 mg of folic acid.

A minimum of 90 iron supplements during pregnancy, containing at least 60 mg of elemental iron and 0.400 mg of folic acid, are expected to meet the mother's needs during pregnancy. Some iron supplements containing less than 60 mg of elemental iron and 0.400 mg of folic acid are feared to be insufficient to meet the mother's needs during pregnancy. Health workers must be careful to provide iron supplements according to the correct specifications (Ministry of Health of the Republic of Indonesia, 2020b).

Anemia

Based on the research results, it was found that of the 85 respondents, the majority of respondents who were not anemic were 58 people (68.2%).Hemoglobin levels in the blood are based on the synthesis of heme and globin molecules, each of which requires iron (Fe) and amino acids or protein. A deficiency in either of these elements will ultimately affect hemoglobin levels.

Laboratory tests of hemoglobin levels are also performed during the third trimester visit to evaluate previous hemoglobin levels and to determine the final status of the pregnancy, thus providing recommendations for a safe delivery. Consumption of iron (Fe) and amino acids (protein) is also influenced by many factors, such as consuming iron supplements that do not meet specifications, or factors that influence amino acid (protein) nutritional intake, such as maternal risk factors (CED, abnormal BMI) that affect nutritional needs of pregnant women, as well as educational and occupational status, which influence maternal decisions in choosing the nutrients (protein) they consume.

The Effect of Iron Supplement Consumption Compliance on Hb Levels in Pregnant Women

Based on the results of the chi-square statistical test, $p = 0.00$ ($p \leq 0.05$) was obtained, meaning Ha was accepted. It can be concluded that there is a relationship between compliance with iron supplement consumption and Hb levels of pregnant women at the Bangko Jaya Community Health Center.

The results of this study also align with Husin's (2014) opinion, which states that iron supplements in pregnant women not only meet the mother's needs but also help maximize brain growth and fetal weight. Fetal weight gain was lower in the pregnant group. Iron supplements in pregnant women can reduce the incidence of anemia in term pregnancies by 73% and the incidence of iron deficiency anemia in term pregnancies by 67%. This can be explained by the fact that iron supplements can increase reticulocytes, red blood cells, and hemoglobin, among other things.

This research is also in accordance with research conducted by Ratih (2017) on the effect of iron (Fe) administration on increasing hemoglobin in anemic pregnant women, which shows that there is an effect of iron (Fe) administration on increasing hemoglobin in anemic pregnant women, as seen from the average increase in hemoglobin levels in anemic pregnant women before administration of iron (Fe) tablets, which was 8.81 ± 0.94 gr% to 12.58 ± 0.83 gr% after administration of iron (Fe) tablets.

Iron supplementation is a strategy to increase iron intake that is only successful if individuals adhere to their daily regimen. Many factors contribute to this low level of compliance, such as difficulty remembering daily intake, lack of funds to purchase supplements regularly, and uncomfortable side effects from the tablets, such as stomach upset (diarrhea), nausea, and vomiting. Another strategy used to increase iron compliance is through education about the importance of iron supplementation and the potential side effects of iron supplementation.

Iron (Fe) tablets or iron-fortified iron tablets (TTD) are supplements containing iron and folate given to pregnant women to prevent iron deficiency anemia during pregnancy, which functions as a form of hemoglobin (Hb) in the blood. Compliance with iron tablet consumption is measured by the accuracy of the number of tablets consumed, the correct method of consuming iron tablets, and the frequency of consumption per day. Iron supplementation or the provision of Fe tablets is one of the important efforts in preventing and treating anemia, especially iron deficiency anemia. Administration of iron tablets begins after nausea and vomiting have disappeared, namely entering the 16th week of pregnancy, consumed 1 tablet daily for a minimum of 90 days. Counseling is provided to increase awareness of pregnant women, such as providing information about the impact of anemia on the mother and fetus, as well as helping pregnant women in dealing with the problem of side effects arising from taking Fe tablets (Wahidah, 2017).

Pregnant women are particularly susceptible to iron deficiency anemia due to increased oxygen demand, which triggers increased erythropoietin production. This results in increased plasma volume and increased red blood cell (erythrocyte) counts. However, the increase in plasma volume is greater than the increase in erythrocytes, resulting in decreased hemoglobin (Hb) concentration due to hemodilution.

Researchers believe that consuming iron tablets increases hemoglobin levels in pregnant women in their third trimester. Regularly taking iron tablets can help prevent anemia, which can cause complications during labor.

CONCLUSION

This study found that of 85 pregnant women at Bangko Jaya Community Health Center, the majority (69.4%) were compliant with iron supplementation, while 68.2% did not experience anemia, with the Chi-Square test showing a significant association (p=0.00; OR=0.17, 95% CI: 0.02-1.18) between compliance and Hb levels. These findings confirm that high compliance correlates with a reduced risk of anemia.

However, limitations of the study include its cross-sectional design, which precludes long-term causal inference, and its reliance on primary questionnaire data, which is susceptible to respondent recall bias. For future research, prospective cohort studies with confounding variables such as nutritional status and education, as well as educational interventions to address side effects such as nausea, are recommended. Practically, these results recommend strengthening ANC counseling at community health centers to improve adherence.

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