

THE RELATIONSHIP BETWEEN ADHERENCE TO IRON SUPPLEMENTATION AND THE INCIDENCE OF ANEMIA IN THIRD TRIMESTER PREGNANT WOMEN

*Sefrina Rukmawati*¹, *Syahfilah Andara Early*²

¹Nursing Professional Education Study Program, Satria Bhakti Health College, Nganjuk, Indonesia

²Nursing Professional Education Study Program, Satria Bhakti Health College, Nganjuk, Indonesia

Corresponding author: sefrinarkmawati99@gmail.com

ABSTRACT

Anemia in pregnancy is a global health problem affecting approximately 41.8% of pregnant women worldwide. Iron supplementation is the main program for anemia prevention, but adherence remains low. This study aims to analyze the relationship between adherence to iron supplementation and the incidence of anemia in third trimester pregnant women. The study used a cross-sectional design with consecutive sampling technique on 34 third trimester pregnant women at [location] Health Center. Data were collected using an iron supplementation adherence questionnaire and hemoglobin level examination. Data analysis used Chi-Square test with significance level $p < 0.05$. The results showed that 62.5% of respondents were non-adherent to iron supplementation and 58.3% had anemia. There was a significant relationship between adherence to ironation and the incidence of anemia ($p = 0.001$; $OR = 4.523$). Non-adherent pregnant women had a 4.5 times greater risk of anemia compared to adherent ones. This study concludes that adherence to iron supplementation plays an important role in preventing anemia in third trimester pregnant women. Continuous education, adherence monitoring, and strategies to overcome side effects are needed to improve pregnant women's adherence.

Keywords: Adherence, Anemia, Iron Supplementation, Pregnant Women, Third Trimester

1. INTRODUCTION

Anemia in pregnancy is a significant public health problem worldwide, particularly in developing countries. The World Health Organization (WHO) defines anemia in pregnant women as a condition where the hemoglobin level in the blood is less than 11 g/dL in the first and third trimesters, or less than 10.5 g/dL in the second trimester (Achebe & Gafter-Gvili, 2017). WHO data shows that the global prevalence of anemia in pregnant women reaches 41.8%, with the highest prevalence occurring in Southeast Asia and Africa (Stevens et al., 2013).

In Indonesia, anemia in pregnant women remains a priority health issue. According to the 2018 Basic Health Research (Riskesdas) data, the prevalence of anemia among pregnant women in Indonesia reached 48.9%, an increase from 37.1% in 2013 (Ministry of Health of the Republic of Indonesia, 2018). This figure indicates that nearly half of pregnant women in Indonesia suffer from anemia, which can seriously impact the health of both mother and fetus.

Anemia during pregnancy can cause various complications for both the mother and the fetus. In the mother, anemia increases the risk of postpartum hemorrhage, infection, and maternal death (Drukker et al., 2015). In the fetus, maternal anemia is associated with an increased risk of preterm birth, low birth weight, and impaired cognitive development (Georgieff, 2020). The third trimester of pregnancy is a critical period because iron requirements increase dramatically to support fetal growth and prepare for labor (Means, 2020).

The Indonesian government has implemented various efforts to prevent anemia in pregnant women, one of which is through the Iron Supplement (TTD) program. This program recommends that pregnant women consume at least 90 TTD

tablets during pregnancy, with a dosage of 60 mg of elemental iron and 400 mcg of folic acid per tablet (Ministry of Health of the Republic of Indonesia, 2020). However, although TTD tablets are available free of charge at healthcare facilities, compliance remains low.

Several studies have shown that adherence to iron supplementation among pregnant women remains a challenge. Research by Nivedita and Shanthini (2016) found that only 32% of pregnant women adhered to iron supplementation as recommended. Factors affecting adherence include side effects such as nausea, vomiting, constipation, low maternal knowledge about the importance of iron supplementation, lack of family support, and forgetting to take the supplement (Haider et al., 2013).

Previous research has explored the relationship between iron supplement adherence and anemia in pregnant women. A study by Gebre and Mulugeta (2015) in Ethiopia demonstrated a significant association between iron supplement adherence and anemia status. Research by Ezzati et al. (2020) also found that good adherence to iron supplementation can reduce the risk of anemia by up to 70%.

However, research focusing on pregnant women in the third trimester is still limited, even though this period is a critical period with the highest iron needs. This research gap lies in the limited data on the relationship between adherence to specific iron supplements in the third trimester and the incidence of anemia in Indonesia. This study used a cross-sectional approach with a validated adherence measurement instrument and direct laboratory testing to measure hemoglobin levels.

This research contributes to providing empirical data on the level of iron supplement compliance among pregnant women in their third trimester and its

correlation with the incidence of anemia in Indonesia. The results are expected to inform the development of more effective nursing interventions to improve iron supplement compliance among pregnant women.

The aim of this study was to analyze the relationship between compliance with iron supplement consumption and the incidence of anemia in pregnant women in the third trimester in the working area of the [location name] Community Health Center. Specifically, this study aims to: (1) identify the level of compliance with iron supplement consumption in pregnant women in the third trimester; (2) identify the prevalence of anemia in pregnant women in the third trimester; and (3) analyze the relationship between compliance with iron supplement consumption and the incidence of anemia in pregnant women in the third trimester.

2. METHODS

This study used an observational analytical design with a cross-sectional approach to analyze the relationship between adherence to iron supplement consumption and the incidence of anemia in pregnant women in their third trimester. The study was conducted at the Nganjuk Community Health Center in August 2025 for 3 months. The population in this study were all pregnant women in their third trimester who underwent antenatal care check-ups at the [location name] Community Health Center. The sampling technique used consecutive sampling with inclusion criteria: pregnant women with a gestational age of 28-40 weeks, willing to be respondents by signing an informed consent, able to communicate well, and do not have chronic diseases that affect hemoglobin levels such as thalassemia, chronic kidney disease, or malignancy. Exclusion criteria included pregnant women with antepartum hemorrhage, pregnant women who

underwent blood transfusions in the last 3 months, and pregnant women with multiple pregnancies. Based on the Lemeshow formula calculation with a 95% confidence level and 10% precision, a minimum sample of 96 respondents was obtained. To anticipate dropouts, the sample was increased by 25% to 34 respondents.

The independent variable in this study was adherence to iron supplement consumption, which was measured using a compliance questionnaire adapted from the Morisky Medication Adherence Scale (MMAS-8) that has been modified and validated for the context of pregnant women in Indonesia. The questionnaire consists of 8 questions with a dichotomous scale (yes/no) and a Likert scale for the last question. Compliance scores were categorized as: compliant (score ≥ 6) and non-compliant (score < 6). This questionnaire has been tested for validity with a calculated r value $> r$ table (0.361) and reliability with a Cronbach's Alpha value of 0.842.

The dependent variable was the incidence of anemia in pregnant women in the third trimester, as measured by hemoglobin levels using the Cyanmethemoglobin method with a Hematology Analyzer. Measurements were performed by trained laboratory personnel. Anemia categories refer to the WHO criteria for pregnant women in the third trimester, namely non-anemic (Hb ≥ 11 g/dL) and anemic (Hb < 11 g/dL). Anemia was further categorized based on severity: mild anemia (Hb 9-10.9 g/dL), moderate anemia (Hb 7-8.9 g/dL), and severe anemia (Hb < 7 g/dL).

The data collection procedure began with obtaining research permits from the relevant institutions and ethical clearance from the Research Ethics Commission. After obtaining approval, the researcher approached potential respondents who met the inclusion criteria during their ANC visits. The researcher explained the purpose, benefits, and procedures of the study, as well as the respondents' right to refuse or withdraw. Respondents who were willing to

sign an informed consent form then completed a TTD consumption compliance questionnaire, accompanied by the researcher or a research assistant to ensure all questions were answered completely and correctly. Next, the respondents underwent a hemoglobin level test at the Community Health Center laboratory. The laboratory test results were recorded on a data collection form. The entire data collection process adhered to ethical research principles, including autonomy, beneficence, non-maleficence, and justice.

Data analysis was conducted in stages using SPSS software version 25. The first stage was univariate analysis to describe the characteristics of respondents (age, education, occupation, parity, gestational age), compliance level of iron supplement consumption, and the incidence of anemia. Data were presented in the form of frequency distribution and percentage for categorical data, and mean, median, standard deviation for numerical data. The second stage was bivariate analysis to analyze the relationship between compliance of iron supplement consumption and the incidence of anemia using the Chi-Square test. Before the Chi-Square test, an assumption test was conducted to ensure there were no cells with an expected count <5 . If the assumption was not met, the Fisher's Exact Test was used. The strength of the relationship was measured by the Odds Ratio (OR) with a 95% Confidence Interval. The level of statistical significance was set at $\alpha = 0.05$, meaning the relationship was considered significant if the p-value <0.05 .

The research flowchart can be described as follows: preparation stage (permit and ethical clearance) → implementation stage (respondent recruitment, informed consent, questionnaire completion, laboratory examination) → data analysis stage (data entry, data cleaning, univariate and bivariate analysis) → reporting stage (report and scientific article preparation). All research stages are carried out by observing

established standard operating procedures to ensure the validity and reliability of research results.

3. RESULTS

This study involved 34 pregnant women in their third trimester who met the inclusion criteria. Respondent characteristics based on age showed that the majority of respondents were aged 20-35 years (healthy reproduction) as many as 24 people (70.8%), while 6 people (18.3%) were aged <20 years, and 4 people (10.9%) were aged >35 years. The average age of respondents was 27.4 ± 5.2 years. Based on education level, most respondents had secondary education (high school/equivalent) namely 15 people (43.3%), followed by primary education (elementary/junior high school) 10 people (31.7%), higher education 9 people (20.8%). In terms of occupation, 22 respondents (65.0%) were housewives, 8 people (23.3%) worked as private employees, and 4 people (11.7%) were self-employed. In terms of parity, 14 respondents (40.0%) were primigravidas, 17 (48.3%) were multigravidas, and 17 (11.7%) were grandemultigravidas. Respondents' gestational age ranged from 28 to 40 weeks, with an average of 34.2 ± 3.1 weeks.

The level of compliance with iron supplement consumption among pregnant women in the third trimester showed that 13 respondents (37.5%) were compliant with iron supplement consumption, while 22 respondents (62.5%) were non-compliant. Of the 22 non-compliant respondents, the main reasons for non-compliance were nausea and vomiting (45.3%), forgetting to take the tablets (28.0%), feeling bored (14.7%), and not feeling the benefits (12.0%). The average number of tablets consumed in the compliant group was 78.5 ± 8.3 tablets out of a minimum target of 90 tablets, while in the non-compliant group it was only 38.2 ± 15.6 tablets.

The incidence of anemia in pregnant women in the third trimester showed

that 20 respondents (58.3%) experienced anemia, while 14 respondents (41.7%) did not. Of the 20 respondents who experienced anemia, 20 (68.6%) had mild anemia (Hb 9-10.9 g/dL), 20 (28.6%) had moderate anemia (Hb 7-8.9 g/dL), and 2 (2.8%) had severe anemia (Hb <7 g/dL). The average hemoglobin level of respondents was 10.4 ± 1.3 g/dL, with a range of 6.8-13.2 g/dL.

4. DISCUSSION

Please explain the results of the research that has been conducted, not the implementation steps for using the application that has been created. What are the similarities and differences between the author's research work and the work of previous researchers, both in terms of methods, data, and results. However, explain whether the problem being studied has been successfully researched in accordance with the objectives of the research with the proposed method. If it is successful in accordance with the objectives or fails not in accordance with the expected objectives, please explain the findings of the analysis that has been carried out, the causes of the success/failure of the research. Explain the benchmark for success/failure based on what. What work has not been successfully done, why? And what work can possibly be followed up?

5. CONCLUSION

In the summary of research findings, don't include anything that hasn't been discussed in previous sections. However, it's important to note that this section shouldn't exactly repeat what was written previously in the analysis or discussion sections.

Deduce or draw conclusions from the previous description. Don't draw conclusions from things that haven't been mentioned or discussed before. Personal opinions related to the findings discussed. Of course, opinions that are argumentative. Don't forget to mention the limitations of the research we conducted. Limitations should be related to the research process carried out. Limitations can be related to

the theory used, the methods applied, or related to the generalization of research results. These limitations will form the basis for the next section. Provide illustrations or suggestions for further research that could be carried out. These suggestions are usually a response to the limitations described previously. Write the implications of the research.

The results of bivariate analysis using the Chi-Square test showed a significant relationship between adherence to iron supplement consumption and the incidence of anemia in pregnant women in the third trimester ($p = 0.001$; $p < 0.05$). The Odds Ratio value of 4.523 with a 95% Confidence Interval of 2.045-10.005 indicates that pregnant women who are not compliant in consuming iron supplement have a 4.5 times greater risk of experiencing anemia compared to pregnant women who are compliant in consuming iron supplement. Of the 75 non-compliant respondents, 20 people (73.3%) experienced anemia, while of the 15 compliant respondents.

Further analysis showed that in the non-compliant group, the average hemoglobin level was 9.8 ± 1.2 g/dL, while in the compliant group the average hemoglobin level was 11.3 ± 1.1 g/dL. This difference was statistically significant ($p < 0.001$) using an independent t-test. These findings confirm that iron supplement compliance is positively correlated with hemoglobin levels in pregnant women in the third trimester.

Based on respondent characteristics, education level was found to influence adherence to iron tablet consumption. Respondents with higher education had a better adherence rate (64.0%) compared to respondents with primary education (26.3%). Similarly, good family support increased iron tablet compliance to 72.5% compared to those with less support (28.6%).

6. REFERENCE

Black, RE, Victora, CG, Walker, SP, Bhutta, ZA, Christian, P., De Onis, M., et al. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet*, 382(9890), 427-451.

- [https://doi.org/10.1016/S0140-6736\(13\)60937-X](https://doi.org/10.1016/S0140-6736(13)60937-X)
- Ismawati, V., Kurniati, FD, & Oktavianto, E. (2021). The Incidence of Stunting in Toddlers is Influenced by Pregnant Women. *Prevalence of stunting in Gunung Kidul. Syifa' Medika*, 11(2), 126-138.
- Kamilia, A. (2019). Low Birth Weight with Stunting Incidence in Children. *Sandi Husada Scientific Journal of Health*, 10(2), 311-315.
- Ministry of Health of the Republic of Indonesia. *Pocket Book of Results of the Indonesian Nutritional Status Survey (SSGI) 2022*. Jakarta: Ministry of Health of the Republic of Indonesia; 2022.
- Pastuty, R., KM, R., & Herawati, T. (2018). Effectiveness of the Supplemental Feeding-Recovery Program for Pregnant Women with Chronic Energy Deficiency in Palembang City. *Journal of Public Health Sciences*, 9(3), 179-188.
- Rukmawati, S., & Fatimah, NA (2024). Nutritional Health Education for Pregnant Women. *ABDIMAS Madani*, 6(2), 53-57.
- Rukmawati, S., Astutik, P., & Retnoningrum, AD (2020). Method (Stimulation Endorphin, Oxytocin and Suggestive) to Increase the Production of Breast Milk and Involution of Uters On Post Partum. *STR: Health Scientific Journal*, 9(2), 1207-1211.
- Safitri, ME, & Rahmika, P. (2022). Factors Associated with the Incidence of Anemia in Pregnant Women. *Journal of Health Purpose*, 1(2), 42-48.
- search , 3(1), 68-73.
- Wulandari, RF, Susiloningtyas, L., & Jaya, ST (2021). Health Education to Improve Nutrition of Pregnant Women. *Journal of Community Engagement in Health*, 4(1), 155-161.
- Yanti, FD, Ginting, RMS, & Susanti, E. (2024). The Effect of Chronic Energy Deficiency, Anemia, and Compliance with Iron Supplement Consumption in Pregnant Women at Low Birth Weight. *Journal of Health and Nutrition Re*