Relationship between pregnant women's compliance in consuming iron tablets with hemoglobin levels

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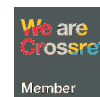## How to cite this article (APA)
Sumiati, S., Nanda, N., Putri, R. D. S., & Anitasari, B. (2025). Relationship between pregnant women's compliance in consuming iron tablets with hemoglobin levels. Jurnal Konseling dan Pendidikan. 13(2), 232-240. https://doi.org/10.29210/1153700

The readers can link to article via https://doi.org/10.29210/1153700

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Relationship between pregnant women's compliance in consuming iron tablets with hemoglobin levels

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ABSTRACT

This study explores the relationship between pregnant women's compliance in consuming iron tablets and their hemoglobin levels, focusing on evidence from previous qualitative studies and literature reviews. Iron supplementation is a critical intervention for preventing anemia during pregnancy, which is a major public health concern worldwide, including in Indonesia. Non-compliance in iron tablet consumption is often linked to various factors such as side effects, lack of knowledge, cultural beliefs, and accessibility issues. Through a qualitative literature review approach, this study synthesizes findings from multiple scholarly articles, reports, and case studies to identify patterns, barriers, and facilitators affecting compliance among pregnant women. The review highlights that adherence to iron supplementation positively correlates with improved hemoglobin levels, which is essential for maternal and fetal health. It also underscores the importance of health education, counseling, and community support in enhancing compliance rates. Cultural sensitivity and tailored interventions are critical to addressing misconceptions and improving iron tablet intake. Furthermore, the study discusses the role of healthcare providers and community health centers, such as Pontap Palopo Community Health Center, in monitoring and promoting adherence to iron supplementation programs. The findings suggest that improving compliance requires a multifaceted approach combining education, accessibility, and supportive healthcare systems. This review provides valuable insights for public health practitioners and policymakers aiming to design effective strategies to combat anemia in pregnancy by improving iron tablet compliance. Future research should consider more localized qualitative studies to understand specific community dynamics influencing compliance behaviors.

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Introduction

Pregnancy begins with the process of meeting the egg and sperm so that fertilization occurs, followed by implantation until the birth of the fetus. The pregnancy period begins from the conception process until the birth of the fetus. The duration of the normal pregnancy process is 280 days (40 weeks or 9 months 10 days) calculated from the first day of the last menstruation (Ambarsari et al., 2023). During pregnancy, there is an increase in energy metabolism, because the need for energy and nutrition is needed for the needs and development of the fetus in the uterus. If there is a lack of certain nutrients that are needed, it can cause the fetus to grow imperfectly. All nutrients needed during pregnancy increase to support the health of the mother and fetus, but often

deficiencies occur, namely protein energy and several minerals such as iron. Iron deficiency in pregnant women can cause the mother to experience iron deficiency anemia which can contribute significantly to increasing maternal mortality rates (Pohan, 2022).

Anemia in pregnancy is defined as a decrease in hemoglobin levels of less than 11 g/dl during pregnancy in the first and third trimesters and less than 10 g/dl during the second trimester and in the postpartum period (Noptriani & Simbolon, 2022).

According to the World Health Organization (WHO), the prevalence of pregnant women experiencing iron deficiency anemia is around 35-37% and increases with increasing gestational age (Nugraheni & Sulastri, 2024). WHO (2021) reported that globally the prevalence of anemia in pregnant women worldwide is 41.8%. It is known The prevalence of anemia in pregnant women in Asia is estimated at 48.2%, Africa 57.1%, America 24.1%, and Europe 25.1% (I. Darmawati et al., 2023).

In addition, as many as 40% of maternal deaths in developing countries are related to anemia in pregnancy and are mostly caused by iron deficiency (Fe) and acute bleeding, and not infrequently both interact with each other. In developed countries, it is estimated that 13% of women experience anemia (Widyawati et al., 2025).

Anemia in pregnant women has health impacts on the mother and child in the womb, including increasing the risk of low birth weight babies, miscarriage, premature birth and neonatal death. Pregnant women with Hb levels <10 g/dl have a 2.25 times higher risk of giving birth to a LBW baby, while pregnant women with severe anemia have a 4.2 times higher risk of giving birth to a LBW baby compared to mothers who are not severely anemic. Anemia in pregnant women can reduce immune function, increase the risk of infection, and reduce the mother's quality of life. Anemia has the potential to cause postpartum depression and the risk of maternal death increases to 3.5 times (Nadeak, 2024).

In the first trimester of pregnancy, iron requirements are still low because menstruation does not occur and fetal growth is still slow (Fitriani & Masluroh, 2024). Increased iron requirements occur in the second to third trimester of pregnancy because the blood volume in a woman's body will increase by 35% while during childbirth additional iron is needed 300 - 350 mg due to blood loss (Nahrisah et al., 2020).

The cause of iron deficiency anemia still occurs due to non-compliance of pregnant women in consuming iron tablets. Pregnant women are advised to consume at least 90 Fe tablets during their pregnancy. If pregnant women are obedient in consuming Fe tablets during pregnancy, the risk of developing anemia is smaller (Situmorang & Nadeak, 2024).

The mother's regularity plays a major role in increasing hemoglobin levels. Hemoglobin levels can indicate the number of red blood cells in the body. Red blood cells play a very important role in the body, namely distributing food to all parts of the body (Fauziyaha & Puspitasari, 2024). When pregnant, the mother's body needs more red blood cells. This is because the mother must flow blood to the fetus that is developing in the womb. This is why the mother must maintain normal body Hb levels, so that both the mother and the fetus remain in healthy condition. Another factor that causes non-compliance of pregnant women in taking Fe tablets is the mother's daily activities and the mother's busy schedule which can cause pregnant women to forget to take the tablets. Family involvement, including parents and husbands, can help prevent this. In order for the mother to maintain and support her pregnancy, the role of the family is very important (Mawene et al., 2022).

Based on the results of the Household Health Survey (SKRT), the prevalence of iron deficiency anemia in Indonesia in pregnant women was 63.5% in 1995, decreased to 40.1% in 2019, and in 2021 decreased to 24.5%. The percentage of anemia in pregnant women has increased over the past 5 years, namely from 2017 to 2022. In the 2018 Riskesdas it was 37.15% while the results of the 2023 Riskesdas have reached 48.9% (Elsharkawy et al., 2022).

Based on the results of the 2018 Basic Health Research (Riskesdas), there were 48.9% of pregnant women with anemia, namely pregnant women with Hemoglobin (Hb) levels of less than 11.0 g/dl, with proportions based on age 15-24 years (84.6%), age 25-34 years (33.7%), age 35-44 (33.6%), and age 45-54 (24%). The high number is caused by, among other things, the low health and nutritional conditions of the mother during pregnancy (Primadewi & Diwyami, 2021).

The way to overcome the problem of iron deficiency anemia in pregnant women carried out by the Indonesian Ministry of Health since 1970 is by implementing a program to provide iron tablets given at health centers and integrated health posts, where one tablet contains 200 mg of ferrous sulfate and 0.25 mg of folic acid (equivalent to 60 mg of iron and 0.25 mg of folic acid). Pregnant women are strongly advised to consume iron tablets during the first 3 months of pregnancy which must be taken every day(Gupta et al., 2024). Although the program to provide iron tablets to pregnant women has been running since 1970, there are still several cases of anemia during pregnancy. Only a few pregnant women in developing countries such as Indonesia can meet their iron needs during pregnancy through daily food, because the main sources of iron that are easily absorbed by the body such as animal protein (fish and meat) are relatively expensive and not yet fully affordable by the community (Suryanih & Galaupa, 2023).

Based on the results of the study, (Ayensu et al., 2020) efforts to prevent anemia in pregnant women in the Sukawati I Health Center work area were mostly carried out through antenatal care examinations, most of which were in the good category, followed by conducting Hb examinations, most of which were in the sufficient category, followed by compliance in consuming blood-boosting tablets, most of which were in the sufficient category, and increasing the knowledge of pregnant women about anemia, most of which were in the poor category.

Literature review conducted by (D. Darmawati et al., 2020) aimed to ensure that the need for iron (Fe) tablets is met during pregnancy so that it can reduce the risk of pregnancy disorders due to anemia problems. From the results of several journals, there is low compliance with taking medication due to forgetfulness and the negative impact of side effects (Adjei-Banuah et al., 2021).

Based on data obtained by the medical records section of the Pontap Palopo Health Center in 2023, there were 30 pregnant women who experienced anemia due to non-compliance with consuming Fe tablets. The number of pregnant women in the Pontap area was 141 pregnant women (Liyew et al., 2021). The coverage of iron provision in 2023 in the Pontap area was around 85%. With this coverage percentage, it is included in the category of exceeding the national target of 80% for the provision of iron tablets during pregnancy (Tola, 2020). At the Pontap Palopo Health Center, pregnant women who received TTD 90 tablets were 100%, the coverage of Fe provision had met the target. However, the level of anemia is still high. Based on an initial survey and interviews with 3 pregnant women at the Pontap Health Center on August 12, the reasons they did not comply with consuming iron tablets were because they forgot and were lazy. 1 of these pregnant women said that after taking the medicine, they felt nauseous, so they rarely took iron tablets (Maumela, 2023).

From the problems described, researchers are interested in knowing the relationship between compliance of pregnant women in consuming iron tablets and hemoglobin levels at the Pontap Palopo Health Center (Konje et al., 2022).

Methods

Type of Research
This study uses a cross-sectional study to see the relationship between variables studied .

Place and Time of Research
Research was conducted in the UPT Pontap Palopo Health Center area , the time of this research was carried out in August - October 2024 .

Population and Sample

The population in this study were pregnant women who underwent examination at the Pontap Palopo Health Center with a total of 141 pregnant women (Sudarmi et al., 2023). The sampling technique used was the *purposive sampling method* .

Data Collection

Data collection using questionnaires MMAS 8 (*Morisky Medication Adherence Scales*) which is used to measure the level of patient compliance by asking eight questions. The MMAS 8 questionnaire has been translated into Indonesian (Ambarwati & Sulastri, 2023). In addition, the instrument used to examine hemoglobin levels is the GcHb Metered Easy Touch .

Data Analysis and Processing

During data analysis , the data that has been collected will be analyzed using *analytical techniques. univariate* and *bivariate* (Kusuma & Kartini, 2021), in crosstabs analysis is used analysis statistics namely Chi Square (Chi-Square), The chi-square test will be used to assess whether there is a significant relationship between Mother's Compliance in Consuming Iron and Hemoglobin Levels. If the results of the Chi-Square analysis show a p value <0.05, this is considered statistically significant (Rumintang et al., 2022).

Results and Discussion

General data includes respondent characteristics such as Gestational age and final education.

Age Characteristics Pregnancy

Table 1. Respondent Characteristics Based on Gestational Age

Gestational Age	Frequency	Percentage (%)
Trimester 2	39	66.1
Trimester 3	20	33.9
Total	59	100.0

Source : Data Primary 2024

Table 1 shows that respondents in this study were of age pregnancy in the second trimester amounted to 39 respondents (66.1 %), and those of age 3rd trimester pregnancies numbered 20 (33.9 %).

Characteristics of Education

Table 2 Respondent Characteristics Based on Educational Background

Education	Frequency	Percentage (%)
Junior High School	6	10.2
Senior High School	42	71.2
Bachelor	11	18.6
Total	59	100.0

Source : Data Primary 2024

Based on table 2, it shows that 6 respondents (10.2%) graduated from junior high school, 42 respondents (71.2 %) graduated from high school, and 11 respondents (18.6%) graduated from undergraduate level .

Frequency Distribution of Compliance Consumption of Iron Tablets

Table 3 shows that respondents in this study who have level compliance high in taking medication 8 respondents (13.6 %), who have level compliance currently totaling 8 respondents (13.6 %), and those who have level compliance low as much as 43 respondents (72.9 %).

Table 3. Characteristics Based on Compliance with Iron Tablet Consumption

Compliance Consumption of Iron Tablets	Frequency	Percentage (%)
Compliance tall	8	13.6
Compliance currently	8	13.6
Compliance low	43	72.9
Total	59	100.0

Source : Data PRIMARY 2024

Frequency Distribution of Hemoglobin Levels

Table 4. Characteristics Based on Hemoglobin Levels

Hemoglobin (hb) levels	Frequency	Percentage (%)
Normal, ≥ 11 gr/dl	43	72.9
Abnormal, ≤ 11 gr/dl	16	27.1
Total	59	100.0
Hemoglobin (hb) levels	Frequency	Percentage (%)

Source : Data PRIMARY 2024

Table 4 shows that respondents in this study who have normal hemoglobin levels are 43 respondents (72.9 %), and levels hemoglobin abnormal amounted to 16 respondents (27.1%).

Distribution Tabulation Connection Compliance Taking Substance Tablets Iron Against Hemoglobin Levels

Table 5. The Relationship Between Compliance in Consuming Iron Tablets and Hemoglobin Levels

Compliance	Hb levels						Total	
	Normal		Abnormal					
	F	%	F	%	F			%
Low	33	55.9	10	16.9	43			72.9
Currently	5	8.5	3	5.1	8			13.6
Tall	5	8.5	3	5.1	8			13.6
	43	72.9	16	27.1	59			100.0
Asymptotic Significance (2-sided)	= 0.001							

Source : Data Primary 2024

Table 5 shows that respondents with a low level of compliance in taking medication totaled 43 individuals (72.9%), with 33 individuals (55.9%) having normal hemoglobin (Hb) levels and 10 individuals (16.9%) having moderate Hb levels. Respondents with a moderate level of compliance totaled 8 individuals (13.6%), with 5 individuals (8.5%) having normal Hb levels and 3 individuals (5.1%) having moderate Hb levels. Meanwhile, respondents with a high level of compliance also totaled 8 individuals (13.6%), with 5 individuals (8.5%) having normal Hb levels and 3 individuals (5.1%) having moderate Hb levels.

Data analysis was conducted using the chi-square statistical test, yielding a significance value of 0.001. This value is lower than the standard significance level (0.05) or ($\rho < \alpha$), indicating that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. This means that there is a significant relationship between pregnant women's compliance in consuming iron tablets and their hemoglobin levels at the Pontap Palopo Health Cente (Falensia et al., 2020).

Frequency Distribution of Pregnant Women's Compliance in Consuming Iron Tablets
Compliance in consume additional tablets blood is obedience Mother pregnant carry out recommendation officer health For consume additional tablets blood . Compliance consume additional tablets blood measured from accuracy number of tablets consumed , accuracy method

consuming substance tablets iron , and frequency consumption per day . Measurement compliance consumption of Fe tablets is obtained through dosage , method drink medicine and time drink drug which is regular . However There is a number of factor affecting compliance consumption of Fe tablets , namely knowledge , motivation , support family , effects side and forgetfulness (Asres et al., 2022).

The results of this study are in line with research conducted by Aghnia (2021) that the results of statistical tests using Chi Square were obtained pvalue 0.005 (Fajriah et al., 2024). There is a relationship level compliance Consumption of Fe tablets in pregnant women in the third trimester with the incidence of anemia in pregnant women in the third trimester at the Community Health Center Margasari. Pregnant women must consume at least 90 Fe tablets daily routine during pregnancy to prevent the occurrence of anemia (Dewi et al., 2023).

According to assumption Researchers say many pregnant women experience side effects side like nausea, constipation, diarrhea, and dizziness after taking Fe tablets. This often becomes reason their main thing is not obedient in consuming the supplement . This shows that the discomfort This physical can make mother pregnant feel reluctant to continue tablet consumption. Boredom Because must taking tablets regularly routine also becomes common reasons put forward. Pregnant women sometimes feel lazy to continue consumption consequence monotony this routine. In addition, some pregnant women No like the taste or aroma of Fe tablets, which can trigger nausea, so they tend to avoid it.

Distribution of Hemoglobin Levels in Pregnant Women

Hemoglobin (Hb) levels are a measure of the concentration of hemoglobin in the blood, which functions as an oxygen-carrying protein in red blood cells. Hemoglobin gives blood its red color and plays an important role in transporting oxygen from the lungs throughout the body and carrying carbon dioxide back to the lungs to be released.

This study is in line with research conducted that most pregnant women are less compliant in taking iron supplements, with 65% of respondents being compliant. Analysis of food intake shows that a large number of pregnant women experience a deficit in iron and vitamin C intake. Hemoglobin levels before the intervention showed that 44% of pregnant women had anemia, but after the intervention, only 6% still had anemia.

According to researchers, non-compliance in taking Fe tablets can cause anemia in pregnant women, which can have a negative impact on the health of the mother and fetus. Anemia during pregnancy is associated with the risk of complications such as premature birth and low birth weight. To prevent iron deficiency anemia, the health department provides pregnant women with iron tablets or iron supplements one tablet every day for ninety days of pregnancy. It is recommended to combine iron tablets with boiled drinking water to increase iron absorption. By taking iron tablets, symptoms of anemia will disappear.

The relationship between pregnant women consuming iron tablets and hemoglobin levels at the Pontap Palopo Health Center

A study conducted by the World Health Organization (WHO) found that pregnant women who received iron supplements had higher hemoglobin levels compared to pregnant women who did not receive iron supplements. Consuming iron during the first trimester of pregnancy may have the most significant effect on mothers who do so because it can reduce the risk of death of their babies. Iron supplementation during pregnancy can prevent and treat anemia. This shows how the increased need for iron, which cannot be met only by diet, but also requires iron supply during pregnancy. Pregnant women have the ability to take iron supplements, so regular iron supplementation is essential to prevent unwanted side effects.

The results of this study indicate that there is a significant relationship between the compliance of pregnant women in consuming iron tablets and hemoglobin levels at the Pontap Palopo Health Center. Ajeng's research (2021) found that consuming iron tablets for one month or thirty tablets can increase Hb by one gram per day and reduce the frequency of anemia in pregnant women by

73%. There is a strong correlation between the compliance of pregnant women with iron tablets and their hemoglobin levels. The more compliant pregnant women are with the use of iron tablets, the higher their hemoglobin levels (Erryca, 2022) this study has no difference with previous research. conducted by Omasti et all (2022) where the results of this study showed that there was a significant relationship between compliance with iron tablet consumption and the incidence of anemia in pregnant women.

Study is in line with the study conducted by Fitriyah et al. (2022) which found that there was a significant relationship between pregnant women's compliance with the use of iron tablets and the incidence of anemia, with a p value = 0.00 (<0.05).

According to the researcher's assumption, there are pregnant women whose compliance level of iron tablet consumption is good, but whose hemoglobin levels are low due to nutritional needs. When the researcher distributed the questionnaire, there were several mothers who said that they rarely consumed vegetables. In fact, consuming vegetables, especially broccoli, spinach, cabbage is very good in preventing iron deficiency, in addition to the food factor consumed, pregnant women must also maintain a rest pattern. As much as possible, pregnant women should avoid doing activities that can drain a lot of energy.

As for pregnant women whose compliance level of iron tablet consumption is low but their hemoglobin levels are good, it is caused by the iron tablets consumed having side effects that can cause nausea and vomiting. This is based on the results of interviews with pregnant women. However, to prevent anemia, pregnant women said that they consume vegetables and fruits. According to the researcher's assumption, the more compliant a pregnant woman is in consuming iron tablets during pregnancy, the less likely she is to experience anemia during pregnancy. Conversely, the less compliant a pregnant woman is, the more likely she is to experience anemia during pregnancy.

Conclusion

Based on the results of research and discussion in the previous chapter on the Relationship between Compliance of Pregnant Women in Consuming Iron Tablets and Hemoglobin Levels at the Pontap Palopo Health Center , it can be it is concluded that: (1) Emoglobin levels in pregnant women at P ontap P alopo Community Health Center shows that of the 59 respondents who have normal hemoglobin levels are 43 respondents (72.9 %), and levels hemoglobin abnormal amounted to 16 respondents (27.1%); (2) Respondents who have level compliance high in taking medication 8 respondents (13.6 %), who have level compliance currently totaling 8 respondents (13.6 %), and those who have level compliance low as much as 43 respondents (72.9 %); (3) Data analysis was conducted using the chi-square statistical test. The significance value obtained was 0.001, which is lower than the standard significance level (0.05) or ($\rho < \alpha$), indicating that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. This means that there is a significant relationship between pregnant women's compliance in consuming iron tablets and their hemoglobin levels at the Pontap Palopo Health Center.

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