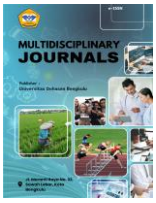
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The Relationship Between Pregnant Women's Compliance In Consuming Iron Tablets And Hemoglobin Levels In The Telaga Dewa Community Health Center Work Area, Bengkulu City, 2024

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Abstract. Pregnancy is a physiological process that women go through. The pregnancy process begins with conception and ends with childbirth. Prevention of emergency conditions during pregnancy is carried out four times throughout the pregnancy period. This effort is done to observe the development and growth of the fetus and monitor the health of the mother during pregnancy. Mothers will undergo hemodilation or blood tests, which put them at risk of anemia. Method: This study used a cross-sectional approach. There were 42 pregnant women in the Telaga Dewa Community Health Center working area who were selected as research samples using accidental sampling techniques. The research subjects had to meet the predetermined inclusion and exclusion criteria. The research data consisted of primary and secondary data. Data or variables were analyzed using the Chi-square formula. Of the 42 pregnant women, 23 (54.8%) were non-compliant and 19 (42.2%) were compliant. For pregnant women with hemoglobin ≥ 11 gr%, 19 pregnant women (42.2%) took iron tablets, while 23 pregnant women (54.8%) with hemoglobin ≤ 11 gr% took iron tablets. The Chi-Square test yielded a P-value (<0.000) < (0.05), indicating a significant association between pregnant women's compliance in taking iron tablets and hemoglobin levels.

Keywords: *Compliance, Pregnant Women, Hemoglobin*

INTRODUCTION

The maternal mortality rate (MMR) is one indicator of maternal health success and status. According to a 2020 World Health Organization (WHO) report, the MMR reached a very high level. Approximately 287,000 women died during pregnancy and after childbirth that year. Globally, in 2020, the MMR rate reached 223 per 100,000 live births, with low-income countries having a higher MMR rate than high-income countries (World Health Organization, 2020). Based on the 2019 Indonesian Health Profile, the MMR incidence in Indonesia was 305 per 100,000 population, or the average life expectancy (Arianggara et al., 2022). The World Health Organization (WHO, 2019) reported that the maternal mortality rate (MMR) reached 289,000 (Warta Kesehatan, 2018). According to the 2012 Indonesian Demographic and Health Survey (SDKI), the MMR in Indonesia reached 359 per 100,000 live births (0.359%) (Ministry of Health, 2018). The maternal mortality rate in ASEAN remains high, at 235 per 100,000 live births (ASEAN Secretariat, 2022). Meanwhile, in Indonesia, the maternal mortality rate decreased to 230 per 100,000 live births in 2022, compared to 303 per 100,000 live births in the previous year (Ministry of Health, 2022). According to the Ministry of Health's Family Health Program, the number of maternal deaths in Indonesia reached 7,389 in 2021. This represents an increase from the 4,627 deaths in 2020. The majority of maternal deaths in 2021 were due to COVID-19

(2,982 cases), hemorrhage (1,320 cases), hypertension during pregnancy (1,077 cases), heart disease (335 cases), infection (207 cases), metabolic disorders (80 cases), circulatory system disorders (65 cases), abortion (14 cases), and other causes (1,309 cases). (Ministry of Health, 2022) Based on the results of the 2018 Basic Health Research (Riskesdas), anemia in pregnant women in Indonesia was 48.9%. Based on these data, the incidence of anemia in pregnant women in Indonesia is still increasing and is considered high. Anemia in pregnancy is defined as pregnant women with Hb levels <11g% in the first and third trimesters or Hb <10.5g% in the second trimester (Ministry of Health, 2022) . The effectiveness of nutritional anemia management has been scientifically studied and tested when implemented according to the dosage and provisions. However, the program of providing iron tablets to pregnant women suffering from anemia does not show real results. This is due to two things, namely: 1). Suboptimal compliance with taking iron tablets; and 2). The iron status of women of childbearing age (WUS) before pregnancy is very low, so the number of iron tablets consumed is not enough to increase hemoglobin (Hb) and iron stores (Ministry of Health, 2022). Based on research results (Widianti, 2022), there is a significant relationship between compliance with iron (Fe) tablet consumption and increased hemoglobin (Hb) levels in pregnant women. Besides compliance, other factors contribute to anemia.

For example, research by Hendrian, R (2020) showed that 51.1% of pregnant women exhibited poor iron tablet consumption behavior. Furthermore, it was found that maternal knowledge, education, and attitudes about iron tablets were related to pregnant women's iron tablet consumption behavior. Compliance with iron tablets refers to the extent to which pregnant women follow the recommendations of health workers to take iron tablets. Compliance with iron tablets is measured by the correct number of tablets consumed, the correct method of consumption, and the frequency of daily consumption. Pregnant women who fail to comply with iron tablets can increase their risk of anemia (Yanti, 2021) . In Bengkulu Province in 2022, it was recorded that 36,101 (87%) of 41,391 pregnant women received iron tablets (Bengkulu Provincial Health Office 2015). Meanwhile, in 2023, there was a decrease of 8% where only 34,386 (79%) of 43,768 pregnant women received iron tablets (90 tablets). In Bengkulu City in 2015, it was recorded that 6,571 (89.27%) of 7,361 pregnant women received iron tablets, a decrease of 6.01% where in 2023 only 6,167 (83.26%) of 7,165 pregnant women received iron tablets (Bengkulu City Health Office 2022). This is one of the causes of the still high number of pregnant women experiencing anemia in Bengkulu City. In Bengkulu Province, the indicator for pregnant women receiving 90 iron supplement tablets (TTD) during pregnancy in Bengkulu Province was 86%.

This figure is still below the figure set in the Ministry of Health's 2018 Strategic Plan, which is 95%. In Bengkulu Province, all districts/cities have not reached the set target. This is because in 2018, iron supplement procurement had to be shared with adolescent girls to meet the coverage of iron supplement provision for adolescent girls in schools (Bengkulu Provincial Health Office 2018). This is one of the causes of the still high number of pregnant women experiencing anemia in Bengkulu City. The maternal mortality rate (MMR) in Bengkulu City in 2018 was 12 people or 175 per 100,000 live births, this figure increased sharply from the mortality rate in 2017, where the mortality rate was only 59.42 per 100,000 live births with the number of deaths being 4 people. Maternal deaths in Bengkulu City in 2018 occurred in postpartum mothers aged 20-34 years as many as 9 people and at the age of over 35 years 3 people, so the total number of maternal deaths was 12 people. Maternal deaths were caused by postpartum hemorrhage (HPP) as many as 4 people, hypertension in pregnancy 2 people due to other causes 6 people. The maternal mortality rate in Bengkulu City is below the maternal mortality rate in the 2019 national target of 306 per 100,000 live births (Bengkulu City Health Office 2019-2023).

LITERATURE REVIEW

Pregnant Mother

Pregnancy is the period during which a woman carries an embryo or fetus within her body (Irianto, 2019). The pregnancy process is a continuous chain of events and consists of ovulation, migration of spermatozoa and ovum, conception and growth of the zygote, nidation (implantation) in the uterus, placenta formation, and the growth and development of the product of conception until term (Manuaba, 2020).

A mother is a woman who has given birth to someone, a term for married women, a respectful address to women whether married or not (Big Indonesian Dictionary, 2005). Pregnancy is carrying a fetus in the womb because the egg is fertilized by spermatozoa (Big Indonesian Dictionary, 2005).

Hemoglobin

Hemoglobin is a red dye from erythrocytes, which has the ability to bind oxygen in the lungs by forming oxyhemoglobin (Herlina, 2008). Hemoglobin is a parameter that is widely used to determine the prevalence of anemia. One indicator for assessing anemia is hemoglobin levels. Hemoglobin is composed of the elements heme and globin protein. One of the components that forms heme is iron (Fe). Iron is naturally obtained from food, which can come from both animals and plants (Supriasa, 2021).

Definition Of Compliance

According to the Big Indonesian Dictionary (Pranoto, 2007), obeying is liking to follow orders, obeying orders, while compliance is behavior that is in accordance with rules and disciplined. Compliance comes from the word obey which means to obey, like to obey and be disciplined towards orders, rules and so on (Ministry of National Education, 2008). Compliance is the level at which patients carry out treatment methods and behaviors recommended by doctors or other people (Slamet, 2007). Compliance is a patient's behavior in following all advice and instructions recommended by medical professionals, such as doctors and pharmacists, or anything that must be done to achieve treatment goals, one of which is adherence to medication (Windiasari, 2009). Compliance with patient treatment requires active patient participation so that the prescribed medical treatment process runs according to the care management system. Patient adherence to healthcare provider recommendations and care is crucial to the success of any intervention. Unfortunately, non-adherence is a significant problem, especially among patients taking iron (Fe) tablets. This can impact various aspects of patient care, including the consistency of visits, medication regimens, and food and fluid restrictions.

Compliance of Pregnant Women in Consuming Fe Tablets

Compliance is an action related to a person's own behavior as stated by Mulyono (2013). Pregnant women who comply with consuming Fe tablets, including compliance with the number of tablets consumed, how to consume Fe tablets, the time to consume Fe tablets, and the frequency of Fe tablets consumed.

It is very important in determining compliance in consuming iron (Fe) tablets. Pregnant women will know how to store and use iron (Fe) tablets. This is supported by research by other people by Muliaty in Sidrap Regency, who found that the motivation of pregnant women is the most influential factor in the compliance of pregnant women in consuming iron tablets an 73% of respondents were compliant in taking iron tablets (Muliaty, 2007). The results of the 2012 Sadariah study at the Bara-Baraya Community Health Center showed that out of 110 samples of pregnant women, 16 (37.2%) of them suffered from anemia, and 43 (39.9%) of them were non-compliant in consuming iron tablets. According to the results of research conducted by Kautshar (2013), the factors causing compliance of pregnant women in consuming Fe tablets

include enabling factors, including the availability of facilities and infrastructure, and reinforcing factors, including family support, support from health workers, and the availability of Fe tablets.

Iron (Fe)

1. Understanding
   Iron is the most abundant micro mineral in humans and animals, accounting for 3-5 grams in an adult human. Iron has several essential functions in the body, including transporting oxygen from the lungs to body tissues, transporting electrons within cells, and serving as an integral part of various enzyme reactions within body tissues (Sibagariang EE, 2010).
2. Composition
   The current government program requires every pregnant woman to receive 90 iron tablets during her pregnancy. The iron tablets contain 320 mg of FeSO4 (60 mg of iron) and 0.25 mg of folic acid. This program aims to prevent and treat anemia in pregnant women (Susiloningtyas, 2016).
3. Properties of Iron
   Iron is a crucial element for the formation of hemoglobin (Hb). In the body, iron functions in the transport, storage, and utilization of oxygen and is present in the form of hemoglobin, myoglobin, or cytochromes.
4. The iron content in the body of women is around 35 mg/kg BW and in men 50 mg/kg BW, where 70% is found in hemoglobin and 25% is iron reserves consisting of ferritin and hemosiderin found in the liver, spleen and bone marrow. The amount of iron that can be stored in the body is 0.5 - 1.5 g in adult men and 0.3 - 1.0 g in adult women, in addition ferritin also functions as a storage place for iron. When all ferritin is occupied, then iron collects in the liver as hemosiderin. Hemosiderin is a collection of all ferritin. Excretion of iron from the body occurs through several routes including through sweat 0.2 - 1.2 mg/day, urine 0.1 mg/day and through feces and menstruation 0.5-1.4 mg/day (Adriani et al., 2012).
5. How to Give
   Anemia is usually treated with iron supplements. Most iron tablets contain ferrous sulfate, ferrous gluconate, or a polysaccharide. Iron tablets are best absorbed if taken 30 minutes before meals. One tablet per day is usually sufficient, though sometimes two are needed. The intestines' ability to absorb iron is limited, so administering larger doses is futile and likely causes digestive upset and constipation. Iron almost always causes black stools, a normal and harmless side effect (Irianto K, 2014).
6. Side effects
   According to Jordan (2004), oral iron supplements can cause nausea, vomiting, stomach cramps, heartburn, and constipation (sometimes diarrhea). However, the degree of nausea caused by each preparation depends on the amount of elemental iron absorbed. Doses of iron above 60 mg (200 mg dry ferrous sulfate) can cause unacceptable side effects in pregnant women, leading to non-compliance with medication use.
7. Iron Metabolism
   Iron (Fe) is an essential trace element for humans. High concentrations of iron are found in red blood cells, as part of the hemoglobin molecule that transports oxygen to the lungs. Hemoglobin transports oxygen to cells that need it to metabolize glucose, fat, and protein into energy (ATP). The iron in the body comes from three sources: iron obtained from the breakdown of red blood cells (hemolysis), iron taken from body stores, and iron absorbed from the digestive tract. Of these three sources, approximately 20-25 mg of iron per day in normal humans comes from hemolysis, and approximately 1 mg comes from limited amounts.

METHODS

The data that has been obtained is then analyzed in the following way:

Univariate Analysis

This analysis aims to obtain an overview of the average frequency distribution using descriptive statistics. The variable analyzed is the number of pregnant women consuming iron tablets at Telaga Dewa in 2024. The formula is as follows:

$$P = \frac{F}{N} X100\%$$

Information :
P = Proportion
F = Frequency
N = Total number of samples

From the formula above, the proportion value obtained in percentage form can be interpreted using the following data:

0% : None of the respondents
1%-25% : As a small part of respondents
26%-49% : Almost half of the respondents
50% : Half of the respondents
51%- 75% : Most of the respondents
76%-99% : Almost all respondents
100% : All respondents

Bivariate Analysis

The bivariate analysis in this study used the correlation coefficient. The correlation coefficient is a value that indicates the strength of the linear relationship between two variables. The correlation coefficient is usually symbolized by the letter r, where the r value can vary from -1 to +1. The aim was to determine the average hemoglobin levels in pregnant women who consumed iron tablets. In this study, a test with a significance level of 0.05 was used. If the alpha value is <0.05, it can be stated that the hypothesis is accepted, so there is a significant influence between the two variables being tested.

RESULTS

Univariate Analysis

The results of a univariate analysis to compare the study subjects by calculating the frequency and percentage of pregnant women's compliance in consuming iron tablets and their hemoglobin levels. The results of the study were as follows:

Table 1 Frequency Distribution of Respondent Compliance

Respondent Characteristics	Frequency	Percentage (%)
Compliance		
Compliance > 65%	19	45.2%
Non-compliant < 65%	23	54.8%

Based on table 1 distribution of respondent compliance frequency, it can be seen that of the 42 respondents, 23 respondents with a percentage of (54.8%) were mostly non-compliant in

consuming Fe tablets and almost all respondents, 19 respondents with a percentage of (45.2%) were compliant in consuming Fe tablets.

Table 2 Frequency Distribution of Respondents' Hemoglobin

Respondent Characteristics	Frequency	Percentage (%)
Hemoglobin		
Hb ≥ Good 11 gr %	19	45.2%
Hb ≤ 11Poor gr %	23	54.8%

Based on table distribution of respondents' hemoglobin frequency, it can be seen that of the 42 respondents, the majority of respondents, namely 23 respondents with a percentage of (54.8%) had poor Hb levels and almost all respondents, namely 19 respondents with a percentage of (45.2%) had good Hb levels.

Bivariate Analysis

Bivariate analysis was conducted to determine a significant relationship between the independent and dependent variables. The Chi-square test was used in this study. To prove the relationship, a Chi-square statistic was performed with a 95% confidence level (α 0.05).

Table 3 Relationship between Pregnant Women's Compliance in Consuming Iron Tablets and Hemoglobin Levels in the Work Area of the Telaga Dewa Community Health Center, Bengkulu City in 2024

Compliance	Hemoglobin Levels in Pregnant Women						
	Hb ≥ 11 gr %		Hb ≤ 11 gr %		Total (%)		P- *Value*
		%	F	%		%	
Obedient	9	45.2%	0	0%	9	45.2%	0,000
Not obey		0%	23	54.8%	3	54.8%	

Based on table 3, the results of the statistical test using *chi square* show that out of 42 respondents, 23 respondents with a percentage of 54.8% were not compliant in consuming Fe tablets and had Hb levels ≥ 11 gr%, while 19 respondents with a percentage of 45.2% were compliant in consuming Fe tablets and had Hb levels ≤ 11 gr%. From the results of the *chi square test* , a p-value of 0.000 < 0.05 was obtained, meaning there is a significant relationship between the compliance of pregnant women in consuming Fe tablets and hemoglobin levels.

DISCUSSION

Univariate Analysis

Based on Table 1 the results of the frequency distribution analysis of respondent compliance indicate that of the 42 respondents, 23 respondents (54.8%) were largely non-compliant in consuming iron tablets. The non-compliance of pregnant women in consuming iron tablets is evident from the respondents' answers to the compliance questions that had been prepared in the questionnaire. Respondents' answers indicate that most respondents did not consume at least 90 iron tablets during pregnancy. This proves that they did not consume iron tablets in the correct amount and frequency. Some respondents even consumed iron tablets with coffee or tea. This of course can reduce iron absorption in the body, thus reducing its benefits. In addition, non-compliance of pregnant women in consuming iron tablets occurs

because many pregnant women refuse or do not comply with this recommendation for various reasons. In fact, compliance of pregnant women in consuming Fe tablets is very important, because by consuming Fe tablets regularly during pregnancy, the Hb levels in pregnant women can be maintained stable and avoid disorders or obstacles in fetal growth, both body cells and brain cells, the risk of morbidity and mortality of mothers and babies, the possibility of giving birth to LBW and premature babies (Sineke, et.all, 2016) .

The results of the frequency distribution analysis of hemoglobin levels showed that of the 42 respondents, most of them, as many as 24 respondents with a percentage (57.1%) had poor Hb levels. This low hemoglobin level can be influenced by the compliance of pregnant women who are mostly non-compliant and the consumption of foods containing low iron and can be at risk of getting anemia. Anemia in pregnant women increases the risk of having a Low Birth Weight (LBW), the risk of bleeding before and during childbirth can even cause death of the mother and her baby if the pregnant woman suffers from severe anemia. The large number of Hb levels <11 gr / dL in the Telaga Dewa Health Center work area is caused by the presence of pregnant women who often consume tea / coffee, we all know that tea and coffee can inhibit the absorption of Fe tablets (Sineke, et.all, 2016) .

Bivariate Analysis

The Relationship Between Pregnant Women's Compliance in Consuming Iron Tablets and Hemoglobin Levels

Based on table 3, the results of the statistical test using *chi square* show that out of 42 respondents, 23 respondents with a percentage of 54.8% were non-compliant in consuming Fe tablets and had Hb levels ≥ 11 gr%, while 19 respondents with a percentage of 45.2% were compliant in consuming Fe tablets and had Hb levels ≤ 11 gr%. The results of the statistical test using *chi square* The p-value obtained is 0.000, which is smaller than <0.05, meaning there is a significant relationship between the compliance of pregnant women in consuming Fe tablets and hemoglobin levels.

Based on the research results, researchers concluded that consuming iron tablets increases hemoglobin levels in pregnant women in the first and second trimesters. Regular consumption of iron tablets can help prevent anemia, which can cause complications during labor and delivery.

Pregnant women are particularly susceptible to iron deficiency anemia because of the higher oxygen demand during pregnancy, which triggers increased erythropoietin production. Consequently, plasma volume increases and red blood cells (erythrocytes) increase. However, the increase in plasma volume is greater than the increase in erythrocytes, resulting in a decrease in hemoglobin (Hb) concentration due to hemodilution. During pregnancy, iron loss occurs due to the transfer of maternal iron to the fetus for erythropoiesis, blood loss during delivery, and lactation. Iron deficiency affects hemoglobin formation, reducing its concentration in red blood cells, resulting in inadequate oxygen transport to all body tissues. Iron requirements increase linearly with gestational age. Although the increase in erythrocyte mass stops in the last 5-10 weeks of pregnancy, fetal erythropoiesis increases in the third trimester and placental iron accumulates. The average gestational iron intake is 840 mg. Approximately 350 mg of iron is transferred to the fetus and placenta, 250 mg is lost in the blood during delivery, and 250 mg is lost through basal cells. Additional iron of around 450 mg is required for the expansion of maternal erythrocyte mass and contributes to the reduction of iron reserves from iron stores during gestation (Suryani, et,all, 2023) .

This is in line with research (Sasqia et.al., 2023) which states that there is a significant relationship between hemoglobin (Hb) levels and adherence to taking iron tablets in pregnant women. If pregnant women are not compliant in taking iron tablets during pregnancy, it can lead

to low hemoglobin levels in pregnant women. This is a common problem during pregnancy, and can result in anemia in pregnant women. Anemia that is not immediately treated can increase the risk of bleeding during and after delivery, increase the risk of Low Birth Weight (LBW) in babies, and can cause death in pregnant women if the anemia is severe.

According to (Amir et.al., 2021), their research results indicate a significant relationship between the compliance of pregnant women in the third trimester in consuming iron tablets and their Hb levels. Mothers who adhered to consuming iron tablets during their pregnancy were able to increase their Hb levels to ≥ 11g%. Meanwhile, pregnant women who did not adhere to consuming iron tablets did not experience an increase in their Hb levels, or <11g%.

This study is also in line with research conducted by (Mendoza et.all, 2020) entitled The Relationship between Compliance with Fe Consumption and Hemoglobin Levels in Third Trimester Pregnant Women with a ρ value of 0.000 <0.05, which means there is a relationship between compliance with Fe tablet consumption and hemoglobin levels in pregnant women. The results of this study indicate that increasing compliance with Fe tablet consumption will be followed by increasing Hb levels in third trimester pregnant women at the Sugihwaras Community Health Center, Bojonegoro Regency. Iron is needed by the body for the formation of hemoglobin.

During pregnancy, the body needs more iron than when not pregnant. This iron is needed to meet basal losses, also for the formation of more red blood cells, and for the needs of the fetus and placenta. If this high need is not met, the possibility of low hemoglobin levels or anemia is quite large. Thus, it can be concluded that pregnant women who are compliant in consuming Fe tablets have an effect on hemoglobin levels.

CONCLUSION

1. A total of 23 respondents with a percentage (54.8%) were mostly non-compliant in consuming Fe tablets.
2. Most of the respondents, 23 respondents with a percentage (54.8%) had Hb levels ≤ 11 gr%.
3. There is a relationship between the compliance of pregnant women in consuming Fe tablets and hemoglobin levels at the Telaga Dewa Community Health Center, Bengkulu City (P-value = 0.000 < 0.05).

SUGGESTION

1. For Community Health Centers, It is hoped that the Community Health Center can provide information and can be used as input in efforts to increase hemoglobin levels in pregnant women by consuming Fe tablets at the Telaga Dewa Community Health Center.
2. For Academics, it is hoped that it can be used as a learning experience and provide useful information and input, especially for nursing students, and can be used as input for colleagues and subsequent researchers to conduct research on The relationship between compliance of pregnant women in consuming Fe tablets and hemoglobin levels.
3. For Students it is hoped that this can be used as a learning discourse for students to increase and broaden their scientific knowledge and as a learning tool related to the relationship between compliance of pregnant women in consuming Fe tablets and hemoglobin levels.
4. For Further Researchers, it is hoped that this can be used as information material in developing further research, especially research on the relationship between compliance of pregnant women in consuming Fe tablets and hemoglobin levels.

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