Original Research

The Indonesian Journal of Public Health
Vol 18. No. 1 April 2023
p- ISSN 1829-7005 e- ISSN 2540-8836

CORRELATION BETWEEN COMPLIANCE WITH IRON TABLET CONSUMPTION AND IRON NUTRITION INTAKE WITH PREGNANT WOMEN'S HEMOGLOBINE CONSUMPTION

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ABSTRACT

Introduction: During pregnancy, the need for iron increases, which triggers anemia. Anemia can be described as a decline in the hemoglobin level below a critical level. Meanwhile, based on a preliminary study, 10 out of 13 pregnant women were not obedient in taking iron tablets (76, 92%). The prevalence of anemia at Tanah Kalikedinding Community Health Center in 2015 remained high. **Method:** The analytical study used a cross-sectional design. The group of pregnant women in the third trimester who received Fe tablets and had their Hb levels checked at the Tanah Kalikedinding Health Center Surabaya were 54 people. The sampling technique chosen was total sampling. The instruments used were questionnaire sheets, data collection sheets, and survey software. Data analysis used the Fisher exact test. **Result :** Out of the 54 pregnant women, 20.4% of pregnant women were obedient to taking blood-supplement pills and experienced an increase in hemoglobin levels (63.3%), 70.6% of pregnant women were not adherent, and almost all of them had decreased their. The results of a bivariate analysis using Fisher's exact showed a significance value of p-value = 0.001 <α = 0.05 (p <α). **Conclusion:** This meant a correlation between adherence to consuming Fe tablets and hemoglobin levels in pregnant women. Also, a p-value of 0.001 (p <α). This means there is a correlation between iron nutritional intake and consumption of blood-supplemented tablets and hemoglobin gravida levels at Puskemas Tanah Kalikedinding, Surabaya.

Keywords: Pregnant, iron doses, iron consumption, hemoglobin

INTRODUCTION

The portrait of maternal health in a country can be viewed from maternal mortality or MMR. The results of the study from the Indonesian Health Demographic Survey explained that maternal health status in Indonesia still needs to be improved where there is an increase in MMR every year with the number of 228/100000 live births (2007) increasing to 359/100000 live births in 2012. The most significant causes of maternal mortality in Indonesia are pre-eclampsia, bleeding and infection (Ministry of Health, 2016).

Postpartum hemorrhage (Hemorrhagic postpartum) accounts for about 25% of maternal mortality in East Java; 70% of postpartum hemorrhage is due to uterine atony. Uterine atony can be interpreted as a condition of weak uterine contractions, which results in the uterus being inadequate in closing blood flow from the former attachment (Langi et al., 2017). One of the predisposing factors that cause uterine atony is a mother who was anemic during pregnancy. Pregnancy with anemia is a condition of pregnant women at a hemoglobin level <11 g% in the first or third trimester of gestation and a hemoglobin level <10.5 g% in the second trimester of pregnancy. Anemic pregnant women have adverse maternal and neonatal implications (Adu-Afarwuah et al., 2017; Jorgensen et al., 2018).

One of the most common causes of anemia during pregnancy is iron deficiency. Iron deficiency anemia is caused by inadequate iron content in food, increased daily iron requirements, and chronic bleeding. Pregnant women have a high risk of iron deficiency anemia (Adu-Afarwuah et al., 2017; Abioye et al., 2019).

Cite this as: Ambarsari, N.D., Herlina, N., Dewanti, L & Ernawati, (2023). Correlation Between Compliance With Iron Tablet Consumption And Iron Nutrition Intake With Pregnant Women's Hemoglobine Consumption, 18(1), 72-81. https://doi.org/10.20473/ijph.v18i1.2023.72-81

Preventive measures to prevent iron deficiency anemia are implemented with a Fe supplementation program preferred for gravida patients. Iron supplementation is necessary during pregnancy because of the increased need for iron. In the form of tablets with blood added or called iron tablets, supplementation helps form erythrocytes and increases hemoglobin levels (Yadi and Jasda, 2019). Therefore, efforts were made to supplement iron with a predetermined dose of one tablet a day, or the equivalent of 60 mg elemental iron and 0.25 mg folic acid. The tablets are consumed during 90 days of pregnancy (Habib et al., 2018; Srivastava et al., 2019).

Iron (Fe) tablets are part of minerals in the human biological system, including during pregnancy. Where mothers need additional iron to increase the number and process of forming erythrocytes for the fetus and placenta. Fe supplementation during pregnancy is an appropriate intervention to improve the desired hemoglobin level. According to Rustam Mochtar (2012), if women regularly take 30 tablets of iron during pregnancy, it can increase Hb by 1 g%. This is also explained by consuming 30-60 mg iron tablets regularly per day. TTD can be started from 12 weeks of gestation until 12 weeks after delivery. This intervention's response can be monitored by improving the hemoglobin value, which increases at least 0.3 g / dl/week (Arisman and Kes, 2009). In 2014, the percentage of pregnant women receiving iron tablets in Indonesia was 85.1%; this figure has not met the national program target of 95%(M. of H. Indonesia, 2013). Although the coverage of women who get iron supplementation is quite good, if the drug is not taken entirely or partially, the planned drug benefits cannot be realized (M'Cormack and Drolet, 2012; Kadry et al., 2018).

According to Health Basic Survey of Indonesia in 2013, data show that 10.9% do not consume Fe, and 89.1% drink Fe. Of the 89.1%, 33.3% of women drank 90 iron tablets or more, 34.4% finished fewer than 90 iron tablets, and 21.4% forgot (P. D. S. K. Indonesia, 2013). Meanwhile, based on the results of a preliminary study conducted on 22-26 October. 2016, in the North Surabaya area, 13 pregnant women who had received Fe tablets showed that: three people (23.08%) regularly drank iron tablets and 10 people (76.92%) %) did not regularly drink TTD.

The results of the preliminary study showed that there were several reasons for the remaining tablets: six mothers (60%) forgot, three mothers (30%) could not stand side effects, one mother (10%) for other reasons, namely lack of appetite. Referring to this, non-compliance in taking blood-added tablet supplements needs attention because inadequate intake of Fe tablets can increase the risk of developing health problems for pregnant women, including anemia (Astuti et al., 2017).

Based on information from the Surabaya Health Office, the prevalence of pregnancy anemia in the Tanah Kali Kali Kedinding Community Health Center's working area was one of the highest in Surabaya in 2015 at 22.7%. This figure is above the prevalence of anemia in pregnant women in Surabaya in 2015, which was 7.18% (Department of Health, 2015). From the explanation and description of the information, this study aimed to determine the correlation between drinking iron supplement compliance and iron nutritional intake with the hemoglobin level of pregnant women at Tanah Kali Kedinding Health Center, Surabaya.

METHODS

The study was conducted in the form of a cross-sectional study. The population was determined to be gravida women in the third trimester who received iron supplementation and had their Hb levels checked at the Tanah Kali Kedinding Health Center, Surabaya, which occurred from March to April 2017.

The inclusion criteria set were: 1) Pregnant women given a TTD health centre

produced by PT. Kimia Farma (composition: 60 mg elemental iron and 0.4 mg folic acid); 2) TM III pregnant women with gestational age ≥34 weeks; 3) Pregnant women who have had Hb examination in the early trimester at Tanah Kali Kedinding Surabaya; 4) State that they are willing to be research respondents; 5) Able to verbal communicate well. Furthermore, the exclusion criteria were: 1) Pregnant women suffering from gastrointestinal/ chronic diseases / hemoglobinopathy; 2) Refuse to be research respondents; 3) Respondents who declined to re-check their Hb at the Puskesmas. The research variables consisted of: 1) The independent variable, namely compliance in consuming iron tablets and nutritional intake of Fe; 2) The dependent variable was the hemoglobin (Hb) level of pregnant women. The sampling technique chosen was total sampling. Adherence in consuming Fe tablets and nutritional intake of Fe became independent variables. Meanwhile, the Hb level of pregnant women is the dependent variable.

Data were obtained by using a structured interview guide in the form of a questionnaire to determine adherence in consuming iron pills (the number of Fe tablets consumed by pregnant women ≥ 90% of 90 Fe tablets) and nutritional intake of Fe (total food intake consumed by pregnant women from the results Recall 2 x 24 hours, and nutritional survey software 2007) of pregnant women were used as primary data. The categories of Fe intake are: good, if ≥ 77% of the RDA for iron in pregnant women, and less, if <77% RDA for pregnant women's iron.

Furthermore, the data used came from the Maternal and Child Health book as secondary data. These data are expected to be used to complement and support the preliminary information that has been collected. The data taken from the KIA book included data on pregnancy hemoglobin level examination, obstetric history and maternal health status.

The research was carried out through the following procedures: 1) The researcher submitted a research data collection request letter to the secretariat of the Airlangga University Midwife Education Study Program; 2) Conducted a research permit from the Surabaya Health Office; 3) Conducted research permission to the head of the Puskesmas; 4) The researcher took the initial information on women with TM III gestational age who received TTD and checked the hemoglobin level at the Puskesmas after obtaining research permission; 5) After getting the initial data, it continued with informed consent from prospective respondents; 6) Collecting primary data and secondary data on respondents willing to take part in the research. Furthermore, the data analysis process is divided into two, namely univariate analysis and bivariate analysis. In statistical analysis, the Chi-square test was performed. As another alternative test, Fisher's test was used. This analysis is used to determine the correlation between the two variables. If $p < \alpha = 0.05$, it can be concluded from the analysis that there is a correlation between the two variables.

The research was conducted after obtaining permission and approval to collect research data at the health center. Informed consent was provided before the study of pregnant women who met the inclusion criteria. If the respondent was willing, then they signed the agreement form. The Ethics Committee of the Faculty of Medicine, Airlangga University has issued a letter of ethical eligibility with letter number 92 / EC / KEPK / FKUA / 2017 for this research.

RESULTS

Characteristics of pregnant women

The following are the results of the distribution of respondent data from this study.

Table 1. Data for Pregnant Women

Characteristics	**N**	**%**
age		
<20 year	2	3.7
20-35 year	44	81.5
>35 year	8	14.8
Education		
Primary School	9	16.7
Junior High School	16	29.6
Senior High School	25	46.3
College	4	7.4
Profession		
Work	8	14.8
Doesn't Work	46	85.2
Gravida		
Primigravida	18	33.3
Multigravida	35	64.8
Grandemultigravida	1	1.9
Previous pregnancy spacing		
Never been pregnant	18	33.3
≤ 2 year	10	18.5
>2 year	26	48.1

Compliance with pregnant women taking blood booster tablets (TTD)

Table 2. Data on compliance of pregnant women taking iron tablets

Compliance with drinking TTD	**N**	**%**
Obey	11	20.4
Not obey	43	79.6
Total	54	100

Almost all of the 54 respondents (79.6%) did not comply with drinking iron tablets.

Nutritional intake of iron obtained from food

Almost all of 54 pregnant women (77.8%) got less nutritional iron intake from food, while a small proportion (22.2%) got good iron nutrition from food.

Table 3. Frequency distribution of Fe nutritional intake of pregnant women obtained from food

Nutritional intake of Fe from food	**N**	**%**
Good	12	22.2
Less	42	77.8
Total	54	100

HB levels of pregnant women before and after consuming TTD

The following is HB data for pregnant women before receiving iron tablets and after consuming iron tablets at the Kali Kedinding Health Center, Surabaya.

Table 4. HB levels before and after consuming TTD

Level HB (gr %)	**N**	**%**
Before		
≥ 11	46	85.2
<11	8	14.8
Total	54	100
Hb level value : 9.7 gr%- 16 gr%, mean ± SD : 12.7 ± 1.6		
After		
≥ 11	41	75.9
<11	13	24.1
Total	54	100
Hb level value : 8.7 gr%- 14.8 gr%, mean ± SD : 11.6 ± 1.25		

* The limit of Hb level 11 g% is the limit of anemia in pregnant women in the first or third trimester of pregnancy (Aryani, 2016).

Changes in the status of the hemoglobin level of pregnant women.

Nearly three-quarters (74%) of respondents' HB levels decreased, while a small proportion (13%) had increased Hb levels, and a small portion (13%) had fixed Hb levels.

Table 5. Hemoglobin status of pregnant women, gestational age ≥34 weeks

Hb Status	n	%
Increase	7	13
Fix	7	13
Decrease	40	74
Total	54	100

Research analysis

The following are the results of the variable statistical test that has been studied.

Table 6. Correlation of adherence to drinking iron supplement with HB conditions in pregnant women

Compliance	Hb levels for pregnant women						Total		p
	Increase		Fix		Decrease				
	n	%	n	%	n	%	n	%	
Obey	7	63.6	3	27.3	1	9.1	11	100	
Not Obey	0	0	4	9.3	39	90.7	43	100	0.001

Table 7. Relationship between nutritional intake and HB pregnant women

Nutritional intake of Fe from food	HB pregnant woman						Total		p *value*
	Increase		Fix		Decrease				
	n	%	n	%	n	%	n	%	
Good	5	41.7	4	33.3	3	25.0	12	100	
Less	2	4.8	3	7.1	37	88.1	42	100	0.001

DISCUSSION

Compliance is defined as a patient's commitment to undergoing therapy and advice given by health workers. Commitment to drinking iron tablets can be due to education, knowledge, support from the environment (husband and family), the role of healthcare, and the presence of iron tablets in health facilities (Prasetyo et al., 2009; Balasubramanian et al., 2016). However, in this study, only the respondents' reasons did not comply with the recommendations for the use of iron tablets and the details were not examined about the factors that influenced the compliance of pregnant women in consuming iron tablets.

The majority of respondents who were not obedient to drinking iron tablets were 31 women with multigravida pregnancies. In contrast, the group of respondents who were compliant in consuming iron tablets were mostly respondents with primigravida pregnancies as many as six people. This finding does not follow previous results where the highest level of adherence was found in multigravida mothers at 60%. This discrepancy is caused because the experience factor influences it. Pregnant women with primigravida pregnancies do not have experience in undergoing pregnancy, so they tend to obey the iron supplement because they do not want bad things to happen to themselves and their babies (Utami et al., 2017; Kadry et al., 2018).

The accuracy of the respondent's behavior in drinking iron tablets according to health workers' instructions is the same as the daily dose of 1 tablet (composition: 60 mg elemental iron and 0.25 mg folic acid), where this provision is carried out routinely with a minimum time of 90 days when pregnant. The compliance variable

can be determined by measuring the percentage of the number of iron tablets consumed compared to the number of iron tablets which should be consumed. Pregnant women were categorized as adherent if they reached ≥90% and non-adherent if the rate was <90%. The measurement of adherence in taking iron tablets is carried out to negate the hemodilution effect that occurs during pregnancy.

Compliance with iron tablets is essential to prevent pregnancy anemia. Non-compliance in drinking iron tablets can also be caused by a lack of communication between health workers and patients. Pregnant women also do not want to ask health workers about things that they do not understand so that at the time of implementation, there are still mistakes (Jirakittidul et al., 2019).

The low compliance of pregnant women to take iron tablets can be influenced by factors including in terms of programs and individual aspects: individuals do not feel sick and do not need drugs, ignorance of the signs of symptoms and their effects, low levels of motivation for pregnant women to drink iron tablets according to the predetermined time of administration. According to health workers, the less attractive color and taste of iron supplementation, fear of the unknown effects of iron supplementation by pregnant women, for example, can make a large fetus and can increase blood pressure, are factors to not comply.

Nutritional intake that contains iron is needed, especially by pregnant women, because there is an increase in maternal iron requirements for placenta and erythrocytes' formation. Daily iron requirements for the body can come from food sources or exogenous. Provision of iron from food can be increased through (1) Consumption of foods containing calories according to the needs of the body, (2) Increasing the availability of natural resources containing iron which can be used for food, disseminating information / promoting foods containing iron and avoiding types of foods that reduce the absorption process of iron in the body (Yani, 2017; Srivastava et al., 2019).

Low iron intake can cause health problems for pregnant women. Nutritional problems can be multifactorial. The nutritional state of pregnant women can be related to the family / closest people's capacity to prepare food in sufficient quantities and various types, education and health behavior patterns, and the health condition of household members. Educational status and knowledge of a person are also crucial components that affect nutritional status (Safithri et al., 2019). However, according to the research analysis results, there is a discrepancy with this theory because there is no relationship between education and pregnant women's nutritional intake (Iqbal and Ekmekcioglu, 2019). Other factors that can affect the level of nutrition consumed by pregnant women include: 1) Socioeconomic levels; 2) Educational level; 3) Knowledge of mothers about foods rich in iron. The condition during pregnancy also affects, including hemodilution, bleeding and other diseases (gastrointestinal disorders, chronic diseases and hemoglobinopathy). This study also did not examine the factors affecting Fe's nutritional intake in pregnant women, so this is a limitation.

Furthermore, based on the relationship test analysis results, there was no correlation between the time of pregnancy and the Hb levels of the respondents. This condition contrasts with previous findings where there was a correlation between pregnancy distance and anemia's prevalence/incidence. This different condition can be because, during the first three months of pregnancy (TM I), the need for iron nutrition is still relatively small. At this time, there has been no hemodilution (Sunuwar et al., 2019).

In the final trimester of pregnancy, another Hb check is performed to determine the HB level of the pregnant woman. In these data, the findings show that the

majority of pregnant women's Hb levels decreased, namely by 40 people (74%), while the rest showed that Hb levels increased by seven people (13%), and fixed Hb levels by seven people (13%). A decrease in the hemoglobin status of pregnant women can be caused by iron deficiency in the body. This is because entering TM II and TM III, pregnant women get hemodiluted conditions, or it can be said that the blood is thin. This is because pregnant women experience an increase in plasma volume in the body that is not proportional to the increase in erythrocyte mass, which causes hemoglobin in pregnant women's blood to decrease (Morton, 2019). One of the results showed that changes in hemoglobin concentration would change as gestational age increases. At TM I gestational age, HB levels appear to have decreased, except in women with low hemoglobin (<11.5 g%). The most inadequate HB label was found when a pregnant woman was at TM II gestational age or around 30 weeks of age. In TM III pregnant women, an increase in HB levels in the blood was obtained except for the condition of women who had high HB levels (> 14.6 g%) at the time of the first test (Padang and Idris, 2019; Putro et al., 2020b). This condition is directly proportional to the findings of this study in which among women who experienced elevated Hb levels almost all had baseline Hb levels <11.5 g%.

Based on the Fisher exact test, with a significance level of $\alpha = 0.05$, a value of $p = 0.001 < \alpha = 0.05$ ($p < \alpha$) was obtained, which means a significant relationship was found between drinking iron supplement compliance with HB levels of pregnant women at the study site. This finding explains the same as previous studies where there was a correlation between the level of adherence to consuming iron tablets with an increase in HB levels in a health facility in the city of Semarang (Puspita et al., 2019).

In this study, the results obtained were one person who obeyed taking iron tablets, but the respondent had a decrease in Hb levels. This can be due to the inadequate intake of Fe from food, so it cannot prevent the decline in Hb due to hemodilution. The rest is due to a lack of knowledge about drinking the right iron supplement (Susanti et al., 2017; Sunuwar et al., 2019). In pregnant women who adhere to taking iron tablets but do not experience an increase in HB levels, it tends to be due to inadequate absorption in the body. This can occur when the mother is sick where the digestive system does not work optimally to absorb nutrients given to the body, including absorbing iron nutrients (McCormack and Drolet, 2012; Ghimire and Pandey, 2013; Putro et al., 2020a).

The Fisher exact test analysis results showed that the value of significance level $\alpha = 0.05$ was obtained; the value of $p = 0.001 < \alpha = 0.05$ ($p < \alpha$) was obtained. From this, it can be concluded that there is a correlation between nutritional intake and HB level of pregnant women at the location where this study was conducted. This supports the findings of previous studies, which indicate a strong correlation between nutritional intake and HB levels of pregnant women. The nutritional intake of pregnant women is beneficial for the growth and development of various fetal organs during pregnancy and helps metabolic processes (Ali et al., 2019; Mansyur et al., 2019). During pregnancy, a woman needs high Fe levels. It can even be said that there is a significant increase in the number of needs. Suppose the iron supply in the body is not sufficient. In that case, the iron in the body is insufficient or unable to meet HB synthesis's needs due to iron deficiency in food. Inadequate Fe intake will affect the HB production process and HB concentration in the blood, which can trigger the hemoglobin level's condition to drop (Sebtiarini et al., 2016; Darmawati et al., 2019).

This study has research limitations. This study uses an analytic method in the form of cross-sectional, in which it is known that the measurement process on the independent and dependent variables is

done simultaneously so that the cause and effect relationship cannot be explained.

CONCLUSION

There is a correlation between adherence to consuming iron supplements (or iron tablets) and the condition of iron nutrition intake with HB levels in pregnant women at the place where the study was conducted (Tanah Kalikedinding Health Care Center, Surabaya).

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