Jurnal Kesehatan
Vol. 18, No. 1, June 2025, pp. 13~24
p-ISSN: 1979-7621, e-ISSN: 2620-7761, DOI: 10.23917/jk.v18i1.5220

Relationship between Anemia Knowledge and Adherence to Taking Blood Additive Tablets with Hemoglobin Levels of Pregnant Women at Gatak Health Center

Dewi Nabila Martianny[1], Muwakhidah[2*], Nur Lathifah Marddiyati[3], Dwi Sarbini[4]

[1,2,3,4]Prodi Ilmu Gizi, Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Surakarta

How to Cite: Martianny, D. N., Muwakhidah, M., Mardiyati, N. L., & Sarbini, D. The Relationship between Anemia Knowledge and Adherence to Taking Blood Additive Tablets with Hemoglobin Levels of Pregnant Women at Gatak Health Center. *Jurnal Kesehatan*, *18*(1), 12–24. https://doi.org/10.23917/jk.v18i1.5220

Article Information

Article History:
Submission: 28 May 2024
Revision: 19 September 2024
Reception: 19 September 2024

Keywords: *Anemia knowledge, blood supplement tablets, hemoglobin level, pregnant women*

ABSTRACT

Introduction: Knowledge of anemia in pregnant women is very influential in compliance with consumption of TTD, while for pregnant women hemoglobin levels are influenced by TTD consumption and intake of nutrients including iron and folic acid. This study aims to determine the relationship between anemia knowledge and compliance with taking blood supplement tablets with hemoglobin levels of pregnant women at Puskesmas Gatak Kartasura. **Method:** This study used 80 samples of pregnant women from 8 villages in the Gatak Health Center area. To determine the knowledge of pregnant women using the questionnaire method, while blood sampling for hemoglobin levels using the *cyanmethemoglobin* method. For the type of design using *cross-sectional* observational methods, and for the relationship analysis test using the *spearman rank* test. **Result:** The results showed a strong relationship between knowledge and compliance (p = 0.000 < 0.05; r = 0.974), knowledge with Hb levels (p = 0.000 < 0.05; r = 0.974), and compliance with Hb levels (p = 0.000 < 0.05; r = 1.000). **Conclusion:** The conclusion of this study, namely there is a relationship between anemia knowledge and compliance with taking TTD, there is a relationship between anemia knowledge and hemoglobin levels, and there is a relationship between compliance with TTD consumption and hemoglobin levels of pregnant women at Gatak Health Center, in the future this research should be developed in the form of experimental research.

Corresponding Authors: (*)
Prodi Ilmu Gizi, Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Surakarta, Surakarta, Garuda Mas Street, No. 8, Gatak, Pabelan, Kartasura, Sukoharjo, Central Java, Indonesia 57169.
Email: muw151@ums.id

INTRODUCTION

Anemia is a condition where the number of red blood cells or the concentration of hemoglobin in them is lower than normal. Hemoglobin is needed to carry oxygen. If

anemia occurs, there will also be a decrease in the blood's capacity to carry oxygen to all body tissues (Tang *et al*, 2019).

Knowledge is a result of human understanding of the cooperation between a knowing subject and a known object. There are several factors that affect knowledge such as education, mass media, information sources, social culture, economy, environment, experience, and age. Knowledge about anemia must be owned by every human being including pregnant women because the risks that can occur in pregnant women who experience anemia are very dangerous, such as pregnant women in the early trimester who experience enamia can increase the risk of premature labor, besides that pregnancy with anemia can cause the baby to be born with anemia as well (Afrinda *et al*, 2023).

The cause of anemia in Indonesia is iron deficiency. Iron is required for the formation of hemoglobin, therefore anemia caused by iron deficiency is referred to as iron deficiency anemia. The iron requirement of mothers during pregnancy will increase significantly and the need is greater than that of non-pregnant mothers (Garzon *et al*, 2020). Anemia in pregnant women brings impacts and complications that are at high risk for miscarriage, bleeding, LBW, uterine atony, uterine inertia, and placental retention. The incidence of anemia in Indonesia is getting higher because anemia treatment is always carried out when the mother is just entering the pregnancy period, not from long before the start of pregnancy (Shofiana and Sumarmi, 2019).

In 2016, according to WHO data, pregnant women who experienced anemia were still relatively high at 40.1%, while in Indonesia according to WHO the prevalence of anemic pregnant women in 2015 was 40.5% and in 2016 was 42%. Results from RISKESDAS in 2013 the prevalence of anemia in pregnant women was 37.1% and increased by 11% in 2018 to 48.9% (Sukoharjo, 2021).

The Sukoharjo District Health Office revealed that the target for the low prevalence of anemia in pregnant women in 2022 was 5.17%, while for Puskesmas Gatak in 2022 the prevalence of pregnant women was 10.16%, this is still relatively high. Coverage of blood supplement tablets for pregnant women in Sukoharjo Regency is 93.2% and at Puskesmas Gatak pregnant women who are obedient or routine in taking Blood Additive Tablets are 83.3%, this still leaves about 9.9% to meet the target of the Sukoharjo District Health Office. The purpose of this study is to show the relationship between anemia knowledge and compliance of pregnant women in taking blood tablets with hemoglobin, while the benefits of this study are to reduce the anemia rate of pregnant women in the Gatak Health Center area.

LITERATURE REVIEW

The process of forming fetal tissues and organs, as well as energy production to maintain the normal activities of pregnant women, requires additional iron during pregnancy. Therefore, the need for iron is higher in pregnant women compared to women who are not pregnant (Soediaoetama, 2013). Normal hemoglobin levels for pregnant women are at least ≥ 11 gr/dL, if < 11 gr/dL then pregnant women are already in the anemia category (Ministry of Health, 2020). Iron anemia is more common in anemia disease, the cause is due to a lack of nutritional intake including iron from food Anemia during pregnancy can be caused by several factors, including the nutrition of pregnant women, compliance in taking iron (Fe) tablets, proper pregnancy monitoring, previous pregnancy history (parity), and the level of education and knowledge of mothers about the dangers of anemia during pregnancy. The combination of these factors can affect the incidence rate of anemia in pregnant women (Ministry of Health, 2020).

It is important for pregnant women to get good prenatal care and have adequate knowledge about the importance of iron intake during pregnancy to prevent and overcome anemia. Signs and symptoms of pregnant women affected by anemia generally include feeling tired throughout the day, drowsiness, weakness, dizziness, headaches, malaise, pica, decreased appetite, changes in appetite, mood swings, and sleep disturbances. In addition, other signs and symptoms include pallor, icterus, low blood pressure when standing, swelling of the feet and hands, changes in mucous membranes, and pale nail beds, tongue, hives, pale pupils, splenomegaly, tachycardia, or flow murmurs, tachypnea and dspnca during activity. If according to the Ministry of Health, the symptoms are generally 5L (Weak, Weak, Lethargic, Lethargic, and Lunglai) (Ministry of Health, 2020).

Knowledge is the result of human curiosity about something and a sense of desire to improve the quality of life, with the aim of achieving a better life to meet current and future human needs (Putri, 2022). Education, socio-culture and economy, environment, experience, and age are some of the factors that can improve the knowledge of pregnant women. Pregnant women with less knowledge about anemia tend to have bad behavior compared to pregnant women who have good knowledge in maintaining their health. Pregnant women with good knowledge will be more routine in consuming iron including blood supplement tablets in preventing anemia. Therefore, increasing knowledge about anemia in pregnant women is needed. This knowledge is usually related to diet and nutrient intake, as well as taking blood supplements (Purbadewi, 2018).

Supplementation of iron and folic acid tablets for pregnant women is based on public health efforts to improve pregnancy outcomes and reduce the incidence of anemia in pregnant women. In developing countries, including Indonesia, there are still frequent problems with iron supplementation, mainly related to the low percentage of pregnant women who receive blood supplements and the lack of adherence to consumption. One way to increase the number of pregnant women who get supplements and ensure adherence to consumption is through intensive nutrition counseling (WHO, 2020). Adherence of pregnant women in taking supplemental blood tablets has been shown to reduce the risk of developing anemia. This compliance also has a positive impact on increasing hemoglobin levels in pregnant women. Pregnant women who are compliant in taking blood supplement tablets have a tendency not to experience anemia. Conversely, pregnant women who are not compliant in taking blood supplement tablets have a higher risk of developing anemia. This is influenced by the level of iron in the mother's body is still not sufficient to produce high levels of hemoglobin (Rizqi, 2019).

Anemia in pregnant women can also be caused by parasitic worm infections. If the number of worms in the intestine increases, it can lead to an increase in blood loss and inhibition of the absorption of iron and other nutrients in the body. This results in iron that should be absorbed by the body being stolen by the worms in the intestines. This situation can disrupt the iron balance, as more iron is lost than absorbed. However, the most influential factors are still related to the amount of iron in the diet, the status of iron reserves, and the intensity and duration of worm infections that occur in the body (WHO 2021).

Leptospirosis is a bacterial disease of the *genus leptospira* that can infect humans, and infected people do not show any symptoms (CDC, 2019). *Leptospirosis* is usually transmitted to humans through contact with rodents such as rats. Human infection can be through wounds, nasal mucosa, mouth, and eyes. In general, transmission of the disease often occurs through water contaminated with urine from infected animals. *Leptospirosis* can also be transmitted from human to human through sexual intercourse, placental

transmission from mother to fetus and also from breast milk to child. The urine of people affected by this infectious disease can also be considered to transmit the disease (WHO, 2021).

METHOD

This study used an *observational* research design using *cross sectional* approach and was a quantitative study. The independent variables were knowledge and compliance, and the dependent variable was hemoglobin level. This study was conducted in eight villages of the Gatak Kartasura Health Center in March to May 2023. This study used 80 samples of pregnant women with inclusion criteria, namely pregnant women who were willing to fill out *informed consent* and with gestational age in the second and third trimesters. For the exclusion criteria in this study population, namely, pregnant women who have pregnancy disorders and suffer from chronic diseases, as well as pregnant women who move their residence or are outside the Gatak Health Center area.

The sampling method used in this study was cluster random sampling. Anemia knowledge was assessed using a structured questionnaire, while hemoglobin levels were measured using the cyanmethemoglobin method with capillary blood samples collected by trained laboratory personnel. Anemia knowledge was categorized into two levels: *good* (knowledge score ≥ 75%) and *poor* (knowledge score < 75%). The 75% threshold was determined based on the median of all knowledge scores. Compliance with iron supplement consumption was evaluated based on the percentage of tablets consumed. Respondents were classified as *compliant* if they consumed ≥ 90% of the tablets provided by healthcare workers, and *non-compliant* if they consumed < 90% (Ministry of Health, 2020). Anemia status was determined by hemoglobin levels: respondents were considered *not anemic* if their hemoglobin was ≥ 11 g/dL and *anemic* if < 11 g/dL, according to measurements obtained using the cyanmethemoglobin method. Data analysis included both univariate and bivariate methods. The Spearman rank test was used to examine correlations, as the data were not normally distributed ($p < 0.05$). This study received ethical approval from Moewardi Hospital Surakarta under ethical clearance number 299/II/HREC/2023.

RESULT AND DISCUSSION

Respondent Characteristics

Data on the characteristics of respondents including maternal age, gestational age, gestational age, previous pregnancy history (for pregnant women who have experienced subsequent pregnancies), maternal education, and maternal occupation can be seen in Table 1.

Characteristics of respondents in this study for the age of respondents as many as 63 pregnant women (78.8%) were productive age (20-35 years), productive age is the ideal age to reproduce and less affected by abnormalities in pregnancy because at that age women's fertility and physiological conditions are more mature to reproduce, based on the age of pregnancy as many as 57 pregnant women (71.3%) the age of pregnancy is in the second trimester and as many as 30 pregnant women (37,5%) had just experienced their first pregnancy (pregnant with their first child), for the history of previous pregnancies, 37 pregnant women (74.0%) gave birth to babies normally until delivery (no history of miscarriage or *abortion* in previous pregnancies), based on the education of pregnant women, 40 respondents (50.1%) had a high school education, and based on work, 51 pregnant women (63.7%) worked as housewives.

Pregnant women's knowledge about anemia

The knowledge of pregnant women greatly affects the occurrence of anemia or not anemia of pregnant women. Based on **Table 2**. the results of the analysis of the level of knowledge of pregnant women about anemia in this study there were 33 pregnant women (41.3%) had poor knowledge (< 75%) and as many as 47 pregnant women (58.8%) had good knowledge (≥ 75%). In 20 questions in the questionnaire, there were three questions that were answered correctly, namely about pregnant women including groups that are vulnerable to anemia (78.75%), added tablets are a solution to prevent anemia (76.25%), and about the minimum TTD recommendations that need to be consumed by pregnant women (60%).

Table 1. Respondent Characteristics Data (N= 80)

Characteristics	n	(%)
Mother's age		
< 20 years	2	2.5
20-35 years	63	78.8
>35 years old	15	18.8
Pregnancy Age		
Trimester 2	57	71.3
Trimester 3	23	28.7
How many pregnancies		
First	30	37.5
Second	25	31.3
Third	16	20.0
Fourth	6	7.5
Fifth	2	2.5
Sixth	1	1.3
Previous pregnancy history		
Abortion	13	16.3
Non abortus	37	74.0
Mother's Education		
SD	1	1.3
SMP	12	15.0
SMA/SMK	40	50.1
D1	3	3.8
D2	1	1.3
D3	5	6.3
S1	18	22.5
Mother's Occupation		
PNS	2	2.5
Private Employee	18	22.5
Entrepreneurship	5	6.3
Labor	4	5.0
IRT	51	63.7

Pregnant women who have good anemia knowledge are due to the fact that they really understand the dangers of anemia and how to prevent it, and always seek information about the dangers of pregnancy including anemia from various sources such as participating in counseling in pregnant women's classes from health workers or information from doctors as well as books and the internet, while pregnant women who have poor anemia knowledge are due to the lack of family and socio-cultural support around them including the existence of myths or food tabuh in their family beliefs.

However, it needs to be emphasized that a person with low education does not mean that his knowledge is always low. Increased knowledge is not absolutely obtained in non-formal education (Riska, 2019).

This is in accordance with Subarda's research, pregnant women with low anemia knowledge have a 1.42 higher chance of not being compliant with taking blood supplement tablets compared to pregnant women with higher anemia knowledge (Iswanto *et al*, 2020). Despite not having good knowledge, repeated and consistent information provision carried out by health workers can remind pregnant women to more regularly consume blood supplement tablets in accordance with the predetermined dose. Repeated information on important messages conveyed when the mother conducts ANC affects the increase in maternal knowledge regarding the use of blood supplement tablets (Bakhtiar et al, 2021).

Table 2. Distribution of Anemia Knowledge, Blood Addition Tablet Adherence, and Hb Levels (N= 80)

Variables	n	(%)
Anemia Knowledge		
Less	33	41.3
Good	47	58.8
Adherence to Taking TTD		
Non-compliant	32	40
Compliant	48	60
Hemoglobin Level		
Anemia	32	40
No Anemia	48	60

Compliance rate of pregnant women taking TTD

Data on adherence to taking blood supplement tablets is measured by the number of Fe tablets consumed by pregnant women from the beginning of pregnancy to the third trimester of pregnancy. Based on Table 2. The results of the analysis of the level of compliance of pregnant women in taking blood supplement tablets found that as many as 32 pregnant women (40%) were still less compliant in taking blood supplement tablets compared to pregnant women who were compliant in taking blood supplement tablets as many as 48 pregnant women (60%). For pregnant women with gestational age in the second trimester, 20 pregnant women (35.1%) received a total of 120 tablets from the Puskesmas staff from the beginning of pregnancy to the second trimester, then 5 pregnant women (8.8%) consumed 115 tablets, and there were 12 pregnant women (21.1%) who left 5 tablets of TTD. Pregnant women with gestational age in the third trimester were 7 pregnant women (30.4%) who received TTD as many as 90 tablets, then as many as 3 pregnant women (13.0%) who consumed TTD as many as 15 tablets, and as many as 3 pregnant women (13.0%) who left TTD as many as 20 tablets.

Pregnant women who are not compliant with taking blood supplement tablets because when taking blood supplement tablets experience side effects such as nausea or vomiting and dizziness, then other causes are caused by pregnant women often forgetting to take blood supplement tablets because they are tired of working so that mothers choose to sleep quickly rather than taking blood supplement tablets first, and there are pregnant women who take blood supplement tablets using tea water, while tea water is not recommended to be consumed together with iron, because in tea there is a tannin content of 7-15% and tannins include strong antigens that function to give a astringent or distinctive taste so that it can precipitate proteins on the cell surface (Kristina, 2018).

Protein also has a very important role for iron absorption, if protein absorption is inhibited, iron absorption is also inhibited because protein plays a role in launching iron transportation in the body (Nopiana et al., 2019).

When consumed together with tea, tannins in the tea will inhibit 79-94% of *non-heme* iron (Besral, 2018). Good compliance can prevent anemia in pregnant women. If pregnant women are not compliant in consuming TTD, there will be a lack of hemoglobin levels in pregnant women, this is one of the health problems that are prone to occur during pregnancy (Kristina, 2018).

Hemoglobin Level of Pregnant Women

Examination of hemoglobin levels is carried out to determine the normal or low Hb levels in pregnant women and to determine whether pregnant women are at risk of anemia or not anemia. From the analysis of hemoglobin levels of pregnant women in the Gatak Health Center area in Table 2, it was found that 32 pregnant women (40%) experienced anemia (Hb < 11 g/dL), and 48 pregnant women (60%) did not experience anemia (Hb ≥ 11 g/dL). Pregnant women who experience anemia can be caused by a lack of a balanced diet, the distance between previous and subsequent pregnancies < 2 years (repeated pregnancies in a short time), and infections such as helminthiasis and malaria which can cause obstacles to iron absorption in the body. Anemia in pregnant women can cause decreased immune function, increased risk of infection, decreased quality of life and impact miscarriage, maternal death which can be caused by bleeding, and newborns < 9 months or babies at risk of *premature* birth (Ministry of Health, 2020).

As for the results of the data in Table 2, there is one respondent who is compliant in taking blood supplement tablets but her anemia knowledge and hemoglobin levels are lacking because the mother still consumes blood supplement tablets with warm tea when going to bed, the mother does not really like plain water and prefers tea water, and for pregnant women respondents who have good knowledge and compliance and do not experience anemia, there are some pregnant women who take blood supplement tablets using bananas and orange water, then the rest are more pregnant women who consume using plain water.

The Relationship between Knowledge of Anemia in Pregnant Women with Adherence to Consuming Blood Addition Tablets

Knowledge of anemia affects the behavior of pregnant women to always be obedient in taking blood supplement tablets, to find out the percentage between anemia knowledge and adherence to taking blood supplement tablets, can be seen in Table 3.

Table 3. Relationship between Anemia Knowledge and Adherence in Taking Blood Additive Tablets (N=80)

Knowledge about Anemia	Compliance				Total	
	Non-compliant		Compliant			
	n	%	n	%	N	%
Less	32	97	1	3	33	100
Good	0	0	47	100	47	100

Table 3 shows that pregnant women who have poor knowledge and are not compliant in taking blood supplement tablets are 97% compared to those with good knowledge, while pregnant women with good knowledge with good compliance in taking blood supplement tablets are 100% compared to those with poor knowledge.

Table 4. Correlation of Anemia Knowledge with Adherence to Taking TTD (N= 80)

Variables	Mean	Standard Deviation	Min	Max	*p*	*r*
Knowledge-Compliance						
Knowledge	73.88	10.37	55	95	0.000*)	0.974
Compliance	66.88	35.63	4.17	100		

*) *Spearman rank* test

Based on Table 4, shows the results of descriptive statistical values of anemia knowledge scores and compliance with taking blood supplement tablets based on percentage results. The *mean* value of the two variables, knowledge 73.88%; standard deviation as much as 10.37%; and for the minimum value in knowledge as much as 55% and a maximum of 95%. The mean score on adherence to taking blood supplement tablets is 66.88%, for a standard deviation of 35.63%, and for a minimum value of 4.17% and a maximum of 100%. the *p* value is 0.000 ($p< 0.05$), this means that the two variables have a relationship. The value of the correlation coefficient (*r*) determines the level of strength of the relationship between the two variables, the value of *r* in the two variables is 0.974, which means that the level of relationship between the two variables is very strong and unidirectional ($r = 0.76$-0.99). The results of this analysis explain that there is a significant and very strong relationship between anemia knowledge and compliance with taking blood supplement tablets in pregnant women at the Gatak Health Center.

If the anemia knowledge of pregnant women is good, then the behavior will also be good, such as pregnant women can understand the dangers and effects of anemia and how to prevent it, then pregnant women will consume foods that contain a lot of iron and iron supplementation such as blood supplement tablets correctly and appropriately according to the recommendations of health workers. Pregnant women who take blood supplement tablets more regularly will affect their hemoglobin levels because blood supplement tablets contain more iron around 35-60 mg of iron every day (Ministry of Health, 2020).

There are several factors that cause anemia in pregnant women, namely taking TTD and diet. Adherence to TTD consumption is one of the health behaviors carried out by pregnant women. A high level of compliance can reduce the incidence of anemia in pregnant women (Anggraini, 2019).

Relationship between knowledge of pregnant women and hemoglobin levels

To find out how much the percentage between anemia knowledge and hemoglobin levels and the relationship between adherence to taking blood supplement tablets and hemoglobin levels can be seen in Table 5.

Table 5. Relationship between Anemia Knowledge and Adherence with Hemoglobin Levels of Pregnant Women (N= 80)

Variables		Hb levels				Total	
		Anemia		Normal			
		n	%	n	%	N	%
Knowledge about Anemia	Less	32	97	1	3	33	100
	Good	0	0	47	100	47	100
Adherence to Taking TTD	Non-compliant	32	100	0	0	32	100
	Compliant	0	0	48	100	48	100

Table 5 shows that anemic pregnant women with poor knowledge are 97% of non-anemic pregnant women, while non-anemic pregnant women with good knowledge are 100% of anemic pregnant women. To find out how strong the relationship between anemia knowledge with hemoglobin levels and compliance with hemoglobin levels of pregnant women can be seen in Table 6.

Based on Table 6, shows the results of descriptive statistical values of anemia knowledge scores and hemoglobin levels based on percentage results. The *mean* value of the two variables, knowledge 73.88%, standard deviation as much as 10.37%, and for the minimum value in knowledge as much as 55% and a maximum of 95%. The mean score on hemoglobin level is 11.36%, for the standard deviation is 1.18%, and for the minimum and maximum value of Hb level is 9.17 g/dL and 13.60 g/dL respectively. The *p* value is 0.000 ($p < 0.05$), this means that the two variables have a relationship. For the *r* value determines the level of strength of the relationship between the two variables, the value of *r* in the two variables is 0.974 which means that the level of relationship between the two variables is very strong and unidirectional (r = 0.76-0.99). The results of this analysis explain that there is a significant and very strong relationship between anemia knowledge and hemoglobin levels of pregnant women at Gatak Health Center.

Table 6. Correlation of Anemia Knowledge and Adherence with Hemoglobin Levels (N= 80)

Variables	Mean	Standard Deviation	Min	Max	*p*	*r*
Knowledge-Hb Level						
Knowledge	73.88	10.37	55	95	0.000*)	0.974
Hb levels	11.36	1.18	9.17	13.60		
Adherence-Hb Level						
Compliance	66.86	35.63	4.17	100	0.000*)	1.000
Hb levels	11.36	1.18	9.17	13.60		

*) *Spearman rank* test

Knowledge is one of the factors that can affect the hemoglobin levels of pregnant women. Pregnant women who have less knowledge about anemia will have less behavior in preventing anemia, otherwise if pregnant women have good knowledge, they will have the right and appropriate behavior in preventing anemia. Therefore, it is necessary to increase the knowledge of pregnant women about anemia in the form of counseling or socialization in pregnant women's classes (Putri et al., 2022). The number of mothers who experience anemia is influenced by the lack of knowledge of pregnant women about foods that contain a lot of iron and the lack of mothers in taking blood supplement tablets containing iron and folic acid, besides that it is also caused by the lack of curiosity of mothers about the benefits of blood supplement tablets (Fitria, 2018).

Pregnant women who have normal hemoglobin levels or are not anemic are more compliant in taking blood tablets and if the mother experiences forgetfulness, usually a family member reminds her to always take blood tablets. In contrast to anemic pregnant women, they often forget to take blood tablets before bed due to fatigue, and also because pregnant women cannot stand the side effects that arise after taking blood tablets such as dizziness or nausea and vomiting.

Relationship between Adherence to Taking Blood Additive Tablets and Hemoglobin Levels of Pregnant Women

Based on Table 5, it shows that pregnant women who are anemic and not obedient in taking blood supplement tablets are 100% compared to pregnant women who are not anemic, while for pregnant women who are not anemic because they are obedient in taking blood supplement tablets are 100% more than pregnant women who are anemic. Based on Table 6, shows the results of descriptive statistical values of adherence scores and hemoglobin levels based on percentage results. The average (*mean)* of the two variables, adherence to taking blood supplement tablets is 66.86%, the standard deviation is 35.63%, and for the minimum value in adherence to taking TTD is 4.17% and a maximum of 100%.

The average score on hemoglobin levels was 11.36%, for the standard deviation was 1.18%, and for the minimum value of Hb levels was 9.17 g/dL and the maximum was 13.60 g/dL. The p value is 0.000 ($p < 0.05$), this means that the two variables have a relationship. For the r value determines the level of strength of the relationship between the two variables, the value of r in the two variables is 1.000 which means that the level of relationship between the two variables is perfect ($r = 1.00$). From the results of the analysis, it explains that there is a significant and very strong relationship between adherence to taking TTD and Hb levels of pregnant women at Gatak Health Center.

The hemoglobin level of pregnant women is normally ≥ 11 g/dL or a range of 11-14 gr/dL, as for the Hb level< 11 g/dL then pregnant women experience anemia. When pregnant women often take blood supplement tablets at least 90 tablets, hemoglobin levels will continue to be produced in the body, plus pregnant women always eat balanced meals and contain rich iron such as meat, chicken liver, spinach vegetables, kale vegetables, and others, as well as foods rich in vitamin C and folic acid such as fresh fruits and vegetables will help produce more red blood cells and hemoglobin in the body (Ministry of Health, 2020).

According to Nina's research (2023), pregnant women who consume less iron intake are 10.5 times more at risk of anemia than pregnant women who often consume Fe intake. Low hemoglobin levels can be caused by the influence of less obedient pregnant women who rarely consume foods that contain high iron, causing the risk of anemia. Anemic pregnant women are at risk of having low birth weight babies (LBW), more risk of bleeding after or after childbirth, this can cause death for mothers and babies if they experience chronic anemia (Rizki et al, 2018)

In addition to consuming iron, pregnant women are also important in consuming folic acid, where the blood supplement tablets not only contain iron but also contain folic acid, both of which work together to produce hemoglobin levels and prevent anemia. One of the functions of folic acid is to form red blood cells for pregnant women and fetuses, and this helps increase the production of hemoglobin levels by working with iron. The need for folic acid in pregnant women is usually around 300-400 µg/day (Hanafiah, 2018). Folic acid deficiency for pregnant women will have an impact on the disruption of erythrocyte nucleus maturation, so that red blood cells appear with abnormal shapes and sizes called megaloblastic anemia, further folic acid metabolism disorders will cause disruption of DNA replication and cell division processes, this will greatly affect the work of all body cells, including in iron metabolism (Zahria and Lupita, 2022). From the results of interviews with respondents, usually when pregnant women conduct obstetric examinations at the nearest health service, health workers always give blood supplement tablets that contain folic acid or are given separately to pregnant women, such as blood supplement tablets themselves and folic acid tablets themselves, and pregnant women

should always routinely consume both every day and simultaneously to accelerate the increase in hemoglobin levels in the mother's body.

CONCLUSION

Descriptive data for knowledge as many as 58.8% of pregnant women who have good knowledge, then as many as 60% of pregnant women obey consuming TTD, and as many as 60% of pregnant women do not experience anemia, while those who experience anemia are 40% of pregnant women. There is a very strong and significant relationship between knowledge and compliance in consuming TTD with hemoglobin levels of pregnant women as evidenced by the *p* value of 0.000 (<0.05). For advice, pregnant women who are anemic (hemoglobin levels are still below 11 g/dL) are expected to be more obedient in taking blood tablets so that hemoglobin levels increase, besides the importance of support from family and the Puskesmas so as not to forget to take blood tablets (TTD).

ACKNOWLEDGEMENT

Thankyou to the Gatak Health Center for giving the opportunity to conduct research on pregnant women in the village area under their supervision.

REFERENCES

Afrinda, Novela., Yopi, W., Anjeli, Ratih. (2023). The Relationship between Pregnant Women's Knowledge of Anemia Prevention Behavior in Pregnant Women in the Pekan Heran Health Center Working Area in 2023. *Journal of Health*. Indragiri Riau Institute of Technology and Business.

Anggraini, Dina Dewi, Purnomo, Windhu, & Trijanto, Bambang. (2018). Maternal Interaction Pregnant Women with Health Workers and its Effect on

Adherence of Pregnant Women Taking Iron (Fe) Tablets and Anemia in the City Health Center in the South Region of Kediri City. *Health System Research Bulletin*, 21(2), 89-92.

Bakhtiar, Rahmat, Muadi, Yusuf, Tamaya, Annisa, Utari, Aisyah, Yuliana, Rita, Ariyanti, Wina. (2021). Knowledge and compliance in taking blood supplement tablets in the working area. *Ked Mulawarman 8* (May 2019), 78-88.

Centers for Disease Control and Prevention. (2019). https://www.cdc.gov/health- topics.html

Fitria, Eza. (2018). The Relationship between Pregnant Women's Knowledge of Fe Tablets with the Incidence of Anemia. *Endurance Journal*, *3*(1), 1. https://doi.org/10.22216/jen.v3i1.1157

Garzon S, Cacciato PM, Certelli C, Salvaggio C, Magliarditi M, Rizzo G.

Iron deficiency anemia in pregnancy: novel approaches for an old problem. *Oman Med J*. 2020;35(5):e166.

Hanafiah, T. M. (2018). Antenatal Care and the Role of Folic Acid in Efforts to Improve the Welfare of Pregnant Women and Fetuses. *Antenatal Care and the Role of Folic Acid*, *31*(4), 189-195. http://inajog.com/index.php/journal/article/download/132/124%0Ahttp://inajog.com/ojs/index.php/journal/article/viewFile/132/124

Iswanto, B., Ichsan, B., & Ermawati, S. (2020). The Relationship between Pregnant Women's Knowledge of Iron Deficiency Anemia and Compliance with Taking Iron Tablets at Karangdowo Health Center, Klaten. *Journal of Health*, *5*(2), 110-118.

Indonesian Ministry of Health. (2020). Guidelines for Providing Blood Addition Tablets (TTD) for Pregnant Women. *Ministry of Health of the Republic of Indonesia*, 24.

Kristina, G. (2018). The Relationship between Adherence of Trimester III Pregnant Women in Consuming Iron Tablets with Hemoglobin Levels in the Mantrijeron Health Center Working Area, Yogyakarta. *GIZIDO 8*(2), 35-44. http://etd.repository.ugm.ac.id/penelitian/detail/156577

Nina, Pramitha. (2023). *The Relationship of Fe and Zinc Intake with the Incidence of Anemia in Pregnant Women at Gatak Health Center*. Nutrition Science Program. University of Muhammadiyah Surakarta.

Nopiana, Kusdalinah, and Meriawati. (2018). The Relationship between Protein and Iron Intake with Hemoglobin Levels. *Journal of Nutrition*. Polytechnic of the Ministry of Health Bengkulu.

Ojofeitimi, E. O., Ogunjuyigbe, P. O., Sanusi, R. A., Orji, E. O., Akinlo, A., Liasu, S. A., & Owolabi, O. O. (2018). Poor dietary intakes of energy and retinol among pregnant women: Implications for pregnancy outcome in Southwest Nigeria. *Pakistan Journal of Nutrition*, *7*(3), 480-484. https://doi.org/10.3923/pjn.2008.480.484

Purbadewi, L., Noor, Y., & Ulvie, S. (2019). Relationship between the level of knowledge about anemia and the incidence of pregnant women. *Journal of Nutrition 2*(April), 31-39. Respati University Yogyakarta.

Putri, Made Ariastuti, Nur, Habibah, and Gusti, Agung, (2022). Overview of Levels Hemoglobin in Pregnant Women in the Tampaksiring I Health Center Working Area. *meditory*. Medical Laboratory Technology. Poltekkes Kemenkes Denpasar. Bali. https://repository.poltekkes-denpasar.ac.id/9798.

Rizqi, Ariyani. (2019). *Factors Affecting the Incidence of Anemia in Third Trimester Pregnant Women in the Mojolaban Health Center Work Area, Sukoharjo Regency*. University of Muhammadiyah Surakarta.

Shofiana F I, Widari D, Sumarmi S. The influence of age, education, and Knowledge on the consumption of blood supplement tablets among pregnant women in Maron Health Center, Probolinggo Regency. *Amerta Nutr*. 2018;2(4):356- 363.

Sukoharjo, Health Office. (2021). *Health Profile of Sukoharjo Health Office 2021*. 1-23.

Tang G, Lausman A, Abdulrehman J, et al. Prevalence of iron deficiency and iron deficiency anemia during pregnancy: a single center Canadian study. Blood 2019; 134:3389.

WHO. (2021). Guideline: Daily iron and folic acid supplementation pregnan woman.Geneva: WHO

World Health Organization. (2019). Leptospirosis accessed on April 28, 2021 WHO. *Recommendations On Antenatal Care for A Positive Pregnancy Experience*.

Zahria Arisanti, A., & Lupita Sari, M. (2022). Benefits of Folic Acid for Pregnant Women and Fetus (Literature Review). *Masada Healthy Journal*, *16*(1), 9-17. https://doi.org/10.38037/jsm.v16i1.258