



Important Factors Affecting the Compliance of Pregnant Women with Iron Deficiency Anemia During a Pandemic

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ABSTRACT

The Covid-19 pandemic has had an impact on the behavior of using health services. One of the impacts is a decrease in visits by pregnant women to health care facilities, including the use and consumption of iron tablets as an effort to prevent anemia. This study aims to analyze the factors that influence the compliance of pregnant women to take iron tablets. This research is an analytic study with a cross-sectional design. Respondents were 35 pregnant women with iron deficiency anemia and met the inclusion criteria. Pearson Test and Multiple Linear Regression Test are used to determine the factors that affect compliance. The results showed that the factors that influenced the compliance of pregnant women to consume iron tablets ($p < 0.05$) were knowledge, attitudes, support from health workers, family support, and social support. This study concludes that knowledge is the most influential factor in changes in hemoglobin in pregnant women with deficiency anemia.

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ABSTRAK

Pandemi Covid-19 membawa dampak terhadap perilaku pemanfaatan layanan kesehatan. Salah satu imbasnya adalah penurunan kunjungan ibu hamil ke fasilitas layanan kesehatan termasuk pemanfaatan dan pengonsumsi tablet tambah darah sebagai upaya pencegahan terjadinya anemia. Tujuan dari penelitian ini adalah untuk menganalisa faktor-faktor yang mempengaruhi kepatuhan ibu hamil untuk mengonsumsi tablet tambah darah. Penelitian merupakan studi analitik dengan rancangan cross-sectional. Responden adalah orang ibu hamil dengan anemia defisiensi besi dan memenuhi kriteria inklusi yang berjumlah 35 orang. Uji Pearson dan Uji Regresi Linear Berganda digunakan untuk mengetahui faktor yang mempengaruhi kepatuhan. Hasil penelitian menunjukkan bahwa faktor yang berpengaruh terhadap kepatuhan ibu hamil untuk mengonsumsi tablet tambah darah ($p < 0,05$) yaitu pengetahuan, sikap, dukungan tenaga kesehatan, dukungan keluarga, dan dukungan sosial. Kesimpulan penelitian ini bahwa pengetahuan menjadi faktor yang paling berpengaruh terhadap perubahan hemoglobin ibu hamil dengan anemia defisiensi.

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INTRODUCTION

Iron deficiency anemia is a condition where there is a decrease in hemoglobin levels below normal values caused by iron deficiency. Iron deficiency anemia in pregnant women is characterized by a decrease in hemoglobin levels <11 g/dl and ferritin levels <20 g/dl (Fitriyani dan Saputri, 2018). The main cause is due to lack of iron intake. Moreover, Kurniati (2020) states that worm infection and malaria can be the cause of iron deficiency anemia.

Monitoring the status of anemia in pregnant women is very important during pregnancy. This is to avoid the adverse effects that may occur to both pregnant women and their unborn babies. Adverse effects that may arise due to anemia during pregnancy include abortion, low birth weight babies, and even cause maternal and infant death (WHO, 2017).

Low iron intake in the mother at the time of conception is also associated with an increased risk of autism in the newborn (Schmidt et al., 2014). Furthermore, Insel et al., (2008) state that low iron intake during the second trimester increases the risk of schizophrenia by up to 30% in children born. Besides that, Newborns with low ferritin also have low memory potential and affect their school performance (Geng et al., 2015).

The government has tried to reduce maternal and infant mortality by preventing the occurrence of iron deficiency anemia in pregnant women through the program of giving iron tablets (Kementrian Kesehatan RI, 2015). Blood supplement tablets as iron supplements are given free of charge at least 90 tablets during pregnancy with the aim of preventing anemia in pregnant women. This program is implemented through puskesmas as the spearhead in providing health services to the community. Puskesmas is a government-owned health facility that provides direct services to pregnant women and conducts health monitoring from pre-pregnancy until after delivery.

The high incidence of anemia in pregnant women indicates that there is a failure in efforts to prevent anemia in pregnant women. One of the contributing factors is related to the compliance of pregnant women in consuming iron tablets. This non-compliance is influenced by factors that can be classified in four ways, namely: understanding of instructions, quality of interaction, social and family support, and attitude and personality beliefs (Niven, 2002). There are internal and external factors in pregnant women that affect compliance in consuming iron tablets. According to (Rahma dkk, 2020) knowledge of pregnant women is the beginning that can have a positive impact on their adherence to taking iron tablets. In addition, awareness about the benefits of taking iron tablets also provides a positive correlation to the compliance of pregnant women in consuming iron tablets (Lutsey et al., 2008). On the other hand, there is a perceived adverse effect if consuming a lot of iron tablets results in a decrease in the compliance of pregnant women to take iron tablets (Birhanu et al., 2018; Sadore et al., 2015; Lutsey et al., 2008).

The compliance rate of pregnant women who consume iron tablets >90 tablets during pregnancy nationally is 62.3% (Kementrian Kesehatan RI, 2018). Adequate availability and good distribution of iron tablets have not been followed by the compliance of pregnant women in consuming iron tablets. Compliance with the consumption of iron tablets for pregnant women is still a problem in efforts to prevent anemia. This condition is one of the factors that can be an obstacle to the success of preventing anemia in pregnant women.

Puskesmas Tanjung Sari Natar is a health center that has the highest number of pregnant women with anemia in South Lampung Regency in 2020, which is 78.42%. According to the Indonesian Ministry of Health, the incidence of anemia is a serious problem (>40%). The coverage of pregnant women who received a minimum of 90 iron tablets reached 99.65% (UPTD Puskesmas Tanjung Sari Natar, 2020). Based on the coverage rate of giving iron tablets to pregnant women, it should have been able to prevent and reduce the incidence of anemia.

The COVID-19 pandemic has had its own impact on health services. One of the impacts is the reduction in the number of visits to the puskesmas and visits by pregnant women (Pangoempia dkk, 2021; Yulia dkk, 2021). Furthermore, Socio-demographic factors, internal and external conditions of pregnant women may have an influence on the compliance of pregnant women to take iron tablets, either directly or indirectly. According to Notoatmodjo (2020), these factors are predisposing factors, enabling factors, and reinforcing factors that can influence human behavior and have an impact on their health.

Based on these things, the formulation of the problem is what factors have an influence on the compliance of pregnant women with iron deficiency anemia to take iron tablets at the Puskesmas Tanjung Sari Natar in 2021. The purpose of this study is to determine the factors that most influence the compliance of pregnant women with iron deficiency anemia to take iron tablets at the Puskesmas Tanjung Sari Natar in 2021.

METHOD

The design of this research was quantitative analytic with a cross sectional survey design. This research was conducted simultaneously with the implementation of the Mother's Class activities at the Health Service Post (Poskesdes). The study was conducted in 8th July-15th August 2021 at five villages in the work area of Puskesmas Tanjung Sari Natar, South Lampung Regency and received approval from the Health Research Ethics Commission, Faculty of Medicine, University of Lampung that was signed on 27th May 2021 with Letter Number 1303/UN26.18/PP.05.02.00/2021.

This study used a questionnaire instrument that had been tested for validity and reliability. The validity test was tested and calculated with the help of a computer, so that a valid questionnaire was obtained, namely a questionnaire that has an rcount greater than r_{table} (0.444), a significance value of 0.05 (5%). The reliability test was carried out on the questionnaire with the aim of knowing its consistency. The reliability test was calculated with the help of a computer using the Cronbach's alpha test. with a value > 0.8.

This study assessed the effect of age, gestation, gestational age, family size, pregnancy planning, knowledge, attitudes, beliefs, support from health workers, family support, social support on the compliance of pregnant women with iron deficiency anemia to take iron tablets. Inclusion criteria were pregnant women aged between 17-45 years, hemoglobin <11 gram%, and ferritin <20 µg/L. Exclusion criteria were pregnant women with a history of chronic infectious disease, preeclampsia, and unfavorable health conditions. The sampling technique used was total sampling that met the inclusion requirements.

The research sample was 35 pregnant women who had met the criteria and received iron tablets from the puskesmas to be consumed once a day for thirty days.

The study began with determining respondents who met the criteria through filling out forms, checking hemoglobin and ferritin levels in the blood. Hemoglobin examination was carried out using the *Mindray BC-3600* Hematology Analyzer and ferritin examination using *Mispa-i3*.

Each respondent was given 30 iron tablets and had to be taken every day. If there were leftover iron tablets that were not taken, they must be taken at the time of the second blood Haemoglobin (HB) level check (after 30 days). From the rest of the iron tablets, it could be seen that respondents were obedient to taking iron tablets or not.

On the thirty-first day, respondents filled out the questionnaire and had their blood checked again to determine changes in hemoglobin levels and anemia status. The questionnaire includes measurements of knowledge, attitudes, beliefs, support from health workers, family support, and social support felt by respondents.

Pearson's test was used to determine the factors that have an influence on respondents' compliance in consuming iron tablets. Multiple Linear Regression Test is used to determine the most dominant factor in influencing changes in respondent compliance. Pearson's Test and Multiple Linear Regression Test were carried out at a significance level of 0.05.

RESULT AND DISCUSSION

Most of the respondents in this study were young couples, small families, and were ready for their pregnancy. It can be seen in Table 1 that most of the respondents are in early adulthood, have high school education, the number of family members is mostly <4, and most of them have planned their pregnancy. Based on anemia status, most of the respondents had moderate anemia.

Another condition is that most of the respondents have knowledge in a good category according to the education level of most high school graduates (SMA), have attitudes in the sufficient category, feel the support of health workers, family support, and social support in good categories. This shows that the respondent is also psychologically in good condition with the support from his family and environment. However, some respondents still have the belief that taking iron tablets can have a detrimental effect on both the respondents themselves and the baby they are carrying. These adverse conditions include increasing blood pressure and making the baby large. This was revealed through a questionnaire filled out by the respondents. Based on their compliance in taking iron tablets, it can be seen that most of them have a moderate to good level of compliance.

Table 2 shows that the results of the Pearson test on the factors that have a meaning on respondents' adherence to taking iron tablets ($p < 0.05$) are knowledge ($p = 0.000$), attitudes (0.013), support from health workers (0.039), support family ($p = 0.000$), and social support ($p = 0.025$). This means that knowledge, attitudes, support from health workers, family support, and social support have a significant influence on respondents' adherence to taking iron tablets. Meanwhile, age, gestational age, gestational age, family size, pregnancy planning, and beliefs did not have a significant effect on the respondent's adherence to taking iron tablets ($p > 0.05$).

Table 1
Frequency Distribution of Respondents Characteristics

Characteristics	Frequency	Percent
Age		
Late Teen	10	28,6
Early Adult	21	60,0
Late Adult	4	11,4
Education		
Elementary School	7	20,0
Junior High School	7	20,0
Senior High School	18	51,4
College	3	8,6
Gestational Age		
Trimester 1	2	5,7
Trimester 2	18	51,4
Trimester 3	15	42,9
Family Size		
≤ 4	25	71,4
> 4	10	28,6
Iron Deficiency Anemia Status		
Light	11	31,4
Medium	24	68,6
Pregnancy Planning		
No	9	25,7
Yes	26	74,3
Knowledge		
Poor	4	11,4
Pretty Enough	4	11,4
Good	27	77,1
Attitude		
Poor	0	0,0
Pretty Enough	22	62,9
Good	13	37,1
Trust		
No	19	54,3
Yes	16	45,7
Health Worker Support		
Poor	0	0,0
Pretty Enough	3	8,6
Good	32	91,4
Family Support		
Poor	0	0,0
Pretty Enough	8	22,9
Good	27	77,1
Social Support		
Poor	0	0,0
Pretty Enough	5	14,3
Good	30	85,7
Compliance		
Poor	6	17,1
Pretty Enough	14	40,0
Good	15	42,9

In the multiple linear regression test, the value of R Square = 0.330, it means that the regression model obtained is able to explain 33.0% of the variation in hemoglobin changes. Based on Table 3, the regression equation obtained is Compliance = $-28,097 + (1,769 * \text{Knowledge}) + (0,548 * \text{Family Support})$. Based on this equation, it can be estimated that the respondent's compliance is based on the variables of knowledge and family support felt by the respondent. Based on Table 4, it is also found that the highest Beta value is knowledge (Beta = 0.494), this means that knowledge has

the greatest influence on respondents' adherence to taking iron tablets.

Table 2
Factors Affecting Respondents' Compliance to Consuming Iron Tablets

Variables	Compliance		
	r	p	R ²
Age	0,220	0,203	0,048
Gestation	0,297	0,084	0,088
Gestational Age	- 0,041	0,815	0,002
Family Size	0,015	0,932	0,000
Education	0,048	0,782	0,002
Pregnancy Planning	- 0,046	0,794	0,002
Knowledge	0,663*	0,000**	0,440
Attitude	0,414*	0,013**	0,171
Trust	0,152	0,384	0,023
Health Worker Support	0,350*	0,039**	0,123
Family Support	0,585*	0,000**	0,342
Social Support	0,378*	0,025**	0,143

*) $t_{count} > t_{table} (0,344)$ **) $p < 0,05$

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Table 3
The Factors Most Affecting Respondents Compliance to Consuming Iron Tablets

Model	B	SE	Beta	T	Sign.
(Constant)	-28,097	16,929		-1,660	0,107
Knowledge	6,184	1,769	0,494	3,495	0,001
Family Support	1,305	0,548	0,336	2,381	0,023

Factors Affecting Adherence to Taking Blood Supplement Tablets

Age did not have a significant effect on respondents' compliance in taking iron tablets. The more mature a person is, the more mature and regular way of thinking is to perform health behaviors (Notoatmodjo, 2020), this behavior includes compliance in taking iron tablets. The results of this study are similar to other studies that there is no relationship between age and compliance of pregnant women in consuming iron tablets in the anemia prevention program (Appiah, Nkuah, & Bonchel, 2020; Hailu, Kassa, Abera, Mulu, & Genanew, 2019; Godara, Hooda, Nanda, & Mann, 2013). According to the researchers, this happened because there was still a lack of information obtained by respondents at all ages, resulting in a lack of understanding of the dangers of anemia and the importance of taking iron tablets during pregnancy.

Gestation did not have a significant effect on the respondent's compliance in taking iron tablets. Another

study stated that there was no relationship between the number of children and adherence to taking iron tablets (Kamidah, 2015). Related to this, the researcher argues that respondents think pregnancy is seen as something normal, natural, and can run normally and naturally without having to be something special so that this condition is the beginning of the absence of differences in attention between the first pregnancy and the second pregnancy and so on. Although pregnancy is actually a very important phase for the beginning of human life and growth. So that this condition has an impact on the value of compliance in consuming iron tablets as an effort to prevent anemia during pregnancy.

Gestational age did not have a significant effect on respondents compliance in taking iron tablets. The results of other studies also show that there is no relationship between gestational age and the compliance of pregnant women in consuming iron tablets in the anemia prevention program (Appiah et al., 2020). During pregnancy there is an increase in the need for iron and hemodilution occurs so that anemia can occur (Kementrian Kesehatan RI, 2015). According to the researcher, this condition has not been known, realized, and understood by the respondents so that it has an impact on the willingness of respondents to prevent anemia during pregnancy by consuming iron tablets. In addition, the researcher also argues that the reason why respondents do not pay attention to each pregnancy period is because respondents think that they will pay more attention when they are nearing the time of delivery and do not understand the nutritional needs that increase along with increasing gestational age. So that there is no more attention related to this gestational age towards the fulfillment of increased nutritional needs, including the fulfillment of iron through adherence to the consumption of iron tablets.

Family size did not have a significant effect on respondents' compliance in consuming iron tablets. The results of a similar study also stated that there was no relationship between family size and respondents' compliance in consuming iron tablets (Ordenes & Bongga, 2006; Kassa, Awraris, Daba, & Tenaw, 2019). According to researchers, family members can influence each other and give each other attention. The attention given to pregnant women in the family will have a positive impact so that it is expected to increase compliance in consuming iron tablets. On the other hand, if there is disharmony in the family, it will have a negative impact and may reduce compliance in consuming iron tablets. In addition, family size will also be related to the fulfillment of adequate nutritional intake in the family. The bigger the family, the higher the probability that one of the family members will not have their nutritional intake fulfilled. Awareness of this can possibly affect respondents' compliance in consuming iron tablets as an effort to meet the increased iron needs. Most of the respondents in this study were small families with family members ≤4 people (71.4%) so that there was no significant difference in forming adherence between respondents in consuming iron tablets.

Knowledge has a significant effect on respondents' compliance in consuming iron tablets. The results of this study have similarities with other studies that there is a relationship between knowledge and compliance of pregnant women in consuming iron tablets in the anemia prevention program (Appiah, Nkuah and Bonchel, 2020; Mardhiah and Marlina, 2019) and there is a significant increase in knowledge among pregnant women. related to nutrition carried out at Puskesmas Rawat Inap Tanjung Sari Natar (Gamani et al, 2021). According to the researcher that

knowledge does have an impact on a person's behavior, including in terms of utilization of health services. The higher the knowledge, the higher the compliance. Based on the results of the exploration of knowledge that the things that are still poorly understood by the respondents are related to iron absorption inhibitors, the impact of anemia in pregnant women, and the consequences of not taking iron tablets. The decrease in understanding related to this was due to the decreased intensity of respondents' meetings with health workers during the Covid-19 pandemic. Other researchers also reported a decrease in visits to puskesmas and inspection visits, such as in Depok and Manado City (Pangoempia, Korompis dan Rumayur, 2021; Yulia et al., 2021).

Attitudes have a significant effect on respondents' compliance in consuming iron tablets. According to Mardhiah and Marlina attitude has a significant effect on adherence to taking iron tablets. Likewise, research conducted by Dara (2019) found that there was a relationship between attitude and adherence to consuming iron tablets at the Puskesmas Muaro Kiawai. Attitude is a person's closed response to a certain stimulus or object that already involves the relevant opinion and emotion factors (Notoatmodjo, 2020). Attitude is also one of the factors that influence a person's behavior. According to the researcher, the condition of good knowledge also has an impact on the formation of respondents' attitudes. So that the respondent's attitude is directly proportional to his knowledge. The better the knowledge, the better the attitude. Likewise, the attitude in shaping the behavior of the respondent that the more the attitude of the respondent increases, the awareness of the respondent to maintain health, meet the increased nutritional needs and prevent anemia during pregnancy by consuming iron tablets. This increase in attitude and awareness will also increase the respondent's compliance to take iron tablets.

Trust does not have a significant effect on respondents' compliance in consuming iron tablets. Trust is something that is believed to be true and does not rely on scientific evidence. According to the Indonesian Ministry of Health, many people find things that are hereditary about iron tablets. So that it can be an obstacle in achieving compliance in consuming iron tablets. The belief in this study is the respondent's belief in the negative effect of consuming iron tablets. Based on the results of the questionnaire, some respondents still believe that iron tablets can increase blood pressure. So this causes respondents to be afraid to take iron tablets every day. Trust that has a negative impact is certainly not good for the condition of the respondent who is anemic. According to researchers, this belief arises as a result of the lack of knowledge of pregnant women about iron tablets. So that the provision of correct and correct information related to anemia and iron tablets becomes a priority because knowledge is a factor that influences the compliance of pregnant women to take iron tablets.

The support of health workers perceived by the respondents had a significant influence on the respondent's compliance in consuming iron tablets. The results of this study have similarities with the research conducted by Mardhiah dan Marlina (2019); Anggraini, Purnomo, dan Trijanto (2018) and Mbhenyane and Cherane (2017) namely the support of health workers has an influence on the compliance of pregnant women in consuming iron tablets. According to Handayani, health workers have an important role in shaping health behavior. The role is as a communicator, motivator, facilitator, and counselor. According to the researcher, this is very reasonable and it is

very possible for health workers to be able to influence and change the behavior of pregnant women in increasing adherence to taking iron tablets even though during the Covid-19 pandemic the intensity of meetings between pregnant women and health workers has decreased. Health workers are still the main reference for respondents in deciding the best course of action for their health. Despite the current condition, other sources of information are very easy to obtain and access through the media, especially online media.

The family support felt by the respondents had a significant influence on the respondent's compliance in consuming iron tablets. Different results were conveyed by Kenang, Maramis, and Wowor (2018), that family support had no effect on the compliance of pregnant women in consuming iron tablets. According to the researchers, this difference was caused by different conditions when the research was conducted. The conditions of the pandemic and the conditions before the pandemic had an impact on communication within the family. The intensity of communication and gathering with family increases during the pandemic. So that when this research was conducted in a pandemic atmosphere, it had an impact that family support was an important factor and had an influence on the compliance of pregnant women in consuming iron tablets. The similarity of the research results was found in a study conducted by Mardhiah and Marlina (2019), where family support had an influence on the compliance of pregnant women in consuming iron tablets. Based on the questionnaire, the compliance level of iron tablet consumption reached 100% with good family support. So the researchers argue that the greater the family support felt by pregnant women, the more positive impact they will have on pregnant women, including participating in the anemia prevention and treatment program by taking blood tablets regularly. Moreover, during the pandemic, families often gather and interact at home and it is easier to monitor the activities of pregnant women at home.

The social support felt by the respondents had a significant influence on the respondent's compliance in consuming iron tablets. The results of this study are different from the research conducted by Nuraeni, that there is no significant relationship between peer support and the adherence of pregnant women to take Fe tablets. Pregnant women cannot be separated from their social life. The condition of social interaction affects lifestyle, including health and utilization of health facilities, namely consuming iron tablets. Based on the questionnaire, it is known that the highest support felt by respondents from neighbors or friends is that they often tell them to take iron tablets with a percentage of 94.3%. The condition of the respondent who has symptoms of anemia such as a pale face, weakness, fatigue, and lethargy is certainly a concern of friends or neighbors who often interact with respondents. Most of them also asked about the complaints felt by pregnant women. This is certainly a positive for pregnant women to always maintain the health of themselves and the fetus. Even in a pandemic, the intensity of communication has not decreased, it is even more intense through online.

The Most Influential Factors on Adherence to Taking Iron Tablets

According to Nurdin, Aritonang dan Anto, the most influential factor in shaping the compliance of pregnant women in consuming extra blood is health education. Meanwhile, according to Ahmad, in his research at the

Puskesmas Bojong Gede Bogor Regency, he concluded that the most influential factor on the compliance of pregnant women in consuming iron tablets was the intensity of service to pregnant women by health workers. In addition, ANC visits are also the most influential factor on the compliance of pregnant women in consuming iron tablets (Sari, Fitriah, & Esitra, 2020). Other researchers concluded that work is the most dominant factor in influencing the compliance of pregnant women to take iron tablets (Sri Hartatik, 2013). If you follow the results of these studies, the support factor of health workers should be the most important factor in this study but this is not the case. According to the researcher, the difference between the results of this study is because this research was conducted during a pandemic, resulting in a decrease in the frequency of meetings between health workers and pregnant women. This decrease in frequency is due to conditions that have not been possible due to the Government's implementation of Community Activity Restrictions during the Covid-19 pandemic. In addition to the implementation of this rule, other conditions have also seen a decrease in the use of health facilities by the public because there is a sense of concern that they may be infected with the corona virus. So that this condition further adds to the reduced intensity of communication between health workers and pregnant women as users of health facilities. This condition is the cause of the declining role of health workers and the support felt by pregnant women. Under normal conditions, health workers have an important role in the process of forming health behavior. Health workers are the main reference in implementing healthy living behaviors, including pregnant women in consuming iron tablets. Because of this condition, knowledge becomes the most influential factor in shaping respondents' compliance in consuming iron tablets.

LIMITATION OF THE STUDY

The limitations of this study are that this study did not assess food consumption (food recall) for both individual respondents and family food consumption so that it could not assess iron intake from foods consumed from food and this study did not examine the status of worms in respondents so that the factor anemia made possible by worms is unavoidable.

CONCLUSION AND RECOMMENDATIONS

Based on the results of the study, it can be concluded that knowledge is the most influential factor on the compliance of pregnant women with iron deficiency anemia to take iron tablets at the Tanjung Sari Natar Health Center. The better the knowledge about anemia and iron tablets, the higher the adherence to taking iron tablets.

Suggestions to policy makers to be able to use this research data as consideration in determining programs related to increasing knowledge about anemia and iron tablets as well as monitoring and evaluating programs on a regular basis with a focus on monitoring the compliance of pregnant women in consuming iron tablets and the condition of anemia status of pregnant women during pregnancy. For other researchers to be able to conduct an assessment of food consumption (food recall) to assess the adequacy of iron intake in pregnant women and conduct an examination of worms to ensure that the anemia

experienced by pregnant women is not anemia caused by worm infection.

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ETHICAL CONSIDERATIONS

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Conflict of Interest statement

The author declares that there is no conflict of interest related to this research and that there are no ethical issues arising from this research.

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