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Education On Consumption of Fe Tablets Increases Hemoglobin Levels Index In Pregnant Women

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ABSTRACT

Anemia is a global public health problem that can increase morbidity and mortality rates among mothers and infant. Education about anemia in pregnant women will get good results when using appropriate media. One of the health promotion methods with persuasive visual messaging is through the use of leaflets. The purpose of this study is to determine the effect of education on Fe tablet consumption on the increase of Hb levels index in pregnant women in the Mlati I Public Health Center region. The research method is a quantitative pre-experimental design with a one group pretest posttest design. The population consists of 149 pregnant women with anemia. The sample is 22 individuals selected using non-probability sampling, specifically purposive sampling. The results of data analysis using wilcoxon test obtains with an asymp. sig (2-tailed) value of 0.001 < 0.05. There is a significant effect ofeducation using leaflets and supervision of taking Fe tablets using observation sheets that are followed up 3x a week on the consumption of Fe tablets with an increase in hemoglobin levels index. This indicates that there is an influence of education on consuming Fe tablets with an increase Hb levels in pregnant women after intervention 4 weeks.

Keywords: Pregnant Women, Anemia, Education, Fe Tablets, Hemoglobin Levels index

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INTRODUCTION

World Health Organization (WHO) defines anemia in pregnancy if the hemoglobin level in pregnant women is less than 11 gr (WHO, 2025) . Anemia is a global public health problem that can increase morbidity and mortality in mothers and infant. Anemia in pregnant women is called ″potential danger to mother and child", pregnant women who suffer from anemia have a chance of experiencing bleeding during childbirth which can result in death, therefore anemia requires attention from all parties involved in health services (Satriani, 2022) .

SKI 2023 shows that anemia in pregnant women is still a public health problem in Indonesia, with a prevalence of 27.7% (Lestari et al., 2023) . Data from the Sleman Regency Health Office, (2024) the prevalence of anemia in pregnant women K1 in Sleman Regency in 2023 was 9.78%, while the prevalence of anemia at the Mlati I Health Center was 18.18% (Sleman Regency Health Office, 2024) .

The main causes of anemia during pregnancy are iron deficiency, folate deficiency, bleeding and hereditary conditions such as sickle cell anemia and thalassemia (Kuma et al., 2021) . Factors that can influence the incidence of anemia in pregnant women are basic factors (socioeconomic, knowledge, education, and culture), direct factors (Antenatal Care Visits, parity, age, and husband's support), indirect factors (pattern of iron tablet consumption, infectious diseases, and bleeding) (Harna et al., 2020) .

The impact of anemia on pregnant women is abortion, premature labor, prolonged labor, postpartum hemorrhage, shock, intrapartum/postpartum infection, besides that the impact of anemia on pregnant women can be observed from the large number of maternal morbidity and mortality, increased fetal morbidity and mortality, and increased risk of low birth weight (Utami et al., 2020) . Anemia not only affects the mother, but also the baby who is born. problems that can occur in babies if the mother suffers from anemia are low birth weight (LBW), IUGR (Intrauterine Growth Restriction), premature birth, fetal death and neonatal death (Astuti et al., 2024) (Farhan & Dhanny, 2021) .

Efforts to prevent and overcome anemia have been carried out by the government and have been standardized through the Regulation of the Minister of Health of the Republic of Indonesia No. 88 of 2014 concerning the standard for iron tablets for women of childbearing age and pregnant women (Syari et al., 2023) . This effort not only includes the provision of iron tablets during pregnancy or a minimum of 90 tablets, but also emphasizes the importance of counseling, information and

education (Ekayanthi & Purnamasari, 2020) .

One effort to overcome the incidence of anemia is to provide health education. Health education is a very important factor and will be successful depending on the design, the right method and the use of appropriate theory (Sang et al., 2022) . Education about anemia in pregnant women will get good results if using the right media, one method of health promotion using visual persuasive message delivery is education using leaflets (Ekayanthi & Purnamasari, 2020) . Media leaflets are effective because they have the advantage of being a health promotion medium that contains material accompanied by images that serve to explain the content presented by the speaker (Aliva et al., 2021). This is reinforced by research Ermitha & Yuniarti, (2020) that shows the influence of health education through media leaflets and WhatsApp on increasing knowledge. Media leaflets are effective because, as a health promotion tool, they contain images that can explain the content of the material presented by the presenter, can be stored for a long time, and can remind people of the material that has been presented by the presenter. Education can increase knowledge and hemoglobin levels in pregnant women with anemia because it can increase compliance in taking iron tablets (Wakwoya et al., 2023) .

METHOD

Quantitative research with pre-experimental design, namely one group pretest posttest design. The location of the study was at the Mlati I Health Center. The research time was March-May 2025. The population was 149 pregnant women with anemia. The sample was 22 people with the sampling technique using *purposive sampling* with inclusion criteria: pregnant women in the first and third trimesters with Hb levels <11gr / dl, pregnant women in the second trimester with Hb levels <10.5gr / dl, mothers do not have chronic diseases, mothers are willing to be respondents. Exclusion criteria: pregnant women with complications, pregnant women who consume drugs that affect hemoglobin levels, pregnant women who enter aterm pregnancy (≥ 37 weeks), and pregnant women who plan to move domicile and health facilities. The time of this study began in March to May 2025.

Calibrated *easy touch blood* Hb level checker. Pregnant women will be checked for *pretest* and *posttest Hb levels*. Before the examination, to ensure that the pregnant woman has anemia, medical records and KIA books are used to see hemoglobin levels. then the mother is given *informed consent* and a

questionnaire containing the mother's identity data. After that, pregnant women will be checked for pretest Hb levels, pregnant women will be given education using leaflets *door to door* and supervision of taking Fe tablets using observation sheets that are followed up 3x a week. After 4 weeks, pregnant women will be checked for Hb levels. Data analysis used the data normality test, namely Saphiro Wilk and the pretest results were 0.025 and posttest 0.052, these data were not normally distributed because p <0.05. Because the data was not normally distributed, the data analysis used the Wilcoxon test. This research has obtained ethical permission from the health research ethics committee of 'Aisyiyah University of Yogyakarta with letter number 2034/KEP-UNISA/II/2025.

RESULTS AND *DISCUSSIONS*

Results

Table 1. Frequency Distribution of Characteristics of Pregnant Women at Mlati I Health Center

Variables	Category	Amount	Presentation
Age	20-35 years	18	81.8
	> 35 years	4	18.2
Education	Junior High School	3	13.6
	Senior High School	10	45.5
	Bachelor	9	40.9
Work	Work	8	36.4
	Doesn't work	14	63.6
Parity	Primigravida	8	36.4
	Multigravida	11	50.0
	Grand multigravida	3	13.6
Gestational Age	Trimester I	5	22.7
	Trimester II	10	45.5
	Trimester III	7	31.8

Source: primary data

Table 2. Analysis of the influence of education on consuming iron tablets on increasing Hb levels in pregnant women at the Mlati I Health Center.

Hb levels	n	Median (Minimum-Maximum)	Mean ± SD	P-value
Pre-test	22	10.4 (9.7-10.9)	10.432 (0.4133)	0.001
Post-test	22	11.2 (9.8-12.9)	11.273 (0.8049)	

Source: Primary data

Discussion

Based on table 1, the results show that the characteristics of the respondents were mostly aged 20-35 years (81.8%), high school education (45.5%), unemployed (63.6%), multigravida parity (50%),

second trimester gestational age (45.5%). The age of pregnant women has a significant relationship with the incidence of anemia and hemoglobin levels during pregnancy. Pregnant women who are in the risky age category, either too young <20 years or too old> 35 years, tend to have a higher chance of experiencing anemia (Sari et al., 2022) . This age factor is related to the physiological condition of the body and nutritional adequacy. Younger pregnant women may not have an optimal diet or experience hormonal changes that affect iron absorption. Meanwhile, older pregnant women are at risk of experiencing health complications that can worsen anemia (Ririn Riyani et al., 2020) . Pregnant women at a young age (<20 years) need a lot of additional nutrition because in addition to being used for their own growth and development, they also have to share it with the fetus they are carrying and for older women over 35 years of age, they also need a lot of energy because the function of the organs is getting weaker and is required to work optimally, so they need sufficient additional energy to support the ongoing pregnancy (Yunida et al., 2022) .

Age factors that are vulnerable to pregnancy are ages that are more or less than healthy reproductive age. It is better if the age of pregnancy is not too young (<20 years) and too old (>35 years, because pregnancy at the age of <20 years and>35 years will increase the risk of pregnancy including anemia (Tampubolon et al., 2021) . Anemia in pregnant women is caused by physiological changes in the cardiovascular system which result in hemodilution or blood thinning. In this condition, the body of a pregnant woman requires a supply of iron to meet the nutritional needs of the fetus, mother and placenta. Meanwhile, the younger and older the age of a pregnant mother, the more it will affect the nutritional needs required (Yunida et al., 2022) . Reproductive age (20 years-35 years) is the best age to get pregnant and give birth (Tri Aksari & Didik Nur Imanah, 2022) .

The level of education of pregnant women is related to the incidence of anemia and hemoglobin levels during pregnancy. Higher education is often associated with a better understanding of health, including the importance of adequate iron and nutritional intake during pregnancy (Bachtiar et al., 2023) . Pregnant women with low levels of education are at higher risk of anemia due to lack of knowledge about healthy eating patterns and access to health information. Education is closely related to the ability to receive information related to health, especially in pregnant women with anemia, such as knowledge of anemia, selection of foods high in iron and iron intake (Muliani et al., 2022) .

Education affects the readiness and knowledge of mothers in undergoing pregnancy and childbirth (Wahyuntari, 2020) . The level of education affects knowledge because a person's ability to accept and understand something is determined by their level of education. The level of education also greatly affects the ability to receive nutritional information, determining or influencing how easy it is for someone to receive knowledge, the higher the education, the easier it is for someone to receive nutritional information (Sasono et al., 2021) . In addition, the acceptance and understanding of information capture by someone who has a higher education is clearly superior to someone who has a lower education (Qomarasari et al., 2023) .

The employment status of pregnant women is related to the incidence of anemia and hemoglobin levels. Employment status is related to the economic status and burden experienced by the mother during pregnancy. Pregnant women with good economic status tend to be able to access more adequate health information, one of which is about the need for pregnant women to consume Fe tablets, so they are more likely to improve their health during pregnancy (Fajarwati & Ama, 2024) . Pregnant women who do not work or have jobs with high stress levels are at higher risk of anemia due to irregular eating patterns and limited access to nutritious food (Ariani et al., 2023) . This is in line with previous research that there is a relationship between work and the incidence of anemia in pregnant women in the second trimester, the results of the study explained that 14 respondents of working pregnant women experienced anemia and 2 respondents did not experience anemia. Meanwhile, 21 respondents of unemployed pregnant women experienced anemia and 2 respondents did not experience anemia (Desi Haryani Aulia & Purwati, 2022) . Excessive workload causes pregnant women to get less rest, which results in red blood cell production not being formed optimally and can result in the mother being anemic or known as anemia (Desi Haryani Aulia & Purwati, 2022) .

Parity is a factor in the occurrence of anemia which is closely related to pregnancy spacing that is too close <2 years, mothers with high parity (many children) are at greater risk of experiencing anemia because consecutive pregnancies can deplete their body's iron reserves, especially if they do not get enough recovery between pregnancies (Afini et al., 2020) . Parity> 4 has a greater risk of experiencing anemia in pregnancy, if they do not pay attention to nutritional needs during pregnancy (Elisa Safitri & Rahmika, 2022) . Mothers who lack

nutrients, especially Fe, will be at risk of causing the mother to experience anemia and will result in bleeding during childbirth (Qomarasari et al., 2023) .

Mothers with high parity (>3) need counseling to pay more attention to their nutritional intake during pregnancy and to routinely carry out pregnancy checks so that any complications that occur can be detected as early as possible (Sari et al., 2022) . Mothers with too close birth spacing do not provide the mother with the opportunity to restore the function of the reproductive organs to the previous pregnancy, causing depletion syndrome. Mothers with anemia in previous pregnancies need approximately 2 years to recover the previous Hb levels (Wahyuntari, 2020) . The higher the parity, the greater the risk of anemia because the iron reserves in the body are decreasing (Qomarasari et al., 2023) .

Gestational age has an influence on the incidence of anemia and hemoglobin (Hb) levels in pregnant women. As gestational age increases, the need for iron increases to support fetal growth and maternal blood production. If these needs are not met, the risk of anemia will increase (Bria & Nur Rohmah, 2023) . Previous research stated that the factors that influence the occurrence of maternal anemia during pregnancy are gestational age, with increasing gestational age in the mother, the risk of developing anemia is greater if it is not balanced with a balanced diet and regular consumption of Fe tablets (Qomarasari et al., 2023) .

In the third trimester of pregnancy, iron is very much needed by the fetus for fetal growth and development as well as supplies after birth, this condition causes pregnant women to be more easily exposed to agents so that they are at risk of anemia. Meanwhile, the nutritional elements of pregnant women are related to the need for iron (Fe), folic acid, and vitamin B12. Gestational age and Hb levels in pregnant women in the third trimester are related to the incidence of low birth weight, while complaints of nausea and vomiting in pregnant women in the first trimester can reduce the availability of iron in the body of pregnant women so that pregnant women in the first trimester are also susceptible to anemia (Surtinah et al., 2022) . The increasing age of pregnancy results in an increase in the percentage of anemia. Physiologically, the process of anemia begins in the first trimester of pregnancy, where there is an increase in the amount of plasma which is not proportional to the increase in the number of blood cells, which peaks at 24-32 weeks of pregnancy (Kusumastuti, 2022) . In pregnancy, the volume of red blood cells increases by 20% to 30%, while the volume of plasma increases by

45 to 55%. This disproportionate increase in volume results in a blood thinning process or what is called hemodilution. This also results in a decrease in Hb levels in pregnant women, resulting in anemia and a decrease in hematocrit (Tri Aksari & Didik Nur Imanah, 2022) .

Based on table 3, it is known that the Hb level in pregnant women before the intervention with a median of 10,432 increased after the intervention in the fourth week to 11,273. The minimum Hb level before the intervention was 9.7 increased to 9.8 after the intervention in the fourth week. The maximum Hb level before the intervention was 10.9 increased to 12.9 after the intervention in the fourth week. The Standard Deviation (SD) before the intervention was 10,432 and after the intervention in the 4th week became 11,273. The results of the statistical test with the Wilcoxon test obtained a P value of 0.001, a value of 0.001 <0.05, so it can be concluded that there is an effect of education on the consumption of iron tablets with an increase in hemoglobin levels in pregnant women.

Based on the results of the study, the researcher assumes that by providing interventions in the form of education on consuming iron tablets using leaflets, it can increase hemoglobin levels in pregnant women. Pregnant women are not only required to meet their iron needs for themselves, but also for the growth of their fetus. The supply of iron from food is still insufficient, so supplements are needed in the form of iron/Fe tablets. This is reinforced by research Sudarmi et al., (2022) which states that providing health education using leaflets and SMS reminders has been proven effective in showing a difference in hemoglobin (HB) levels, and there is a significant effect on the level of compliance in consuming Fe tablets among pregnant women in their third trimester. The implementation of health promotion through leaflets and WhatsApp on Fe tablets compliance in pregnant women is more effective and easier to understand, thereby increasing knowledge and influencing behavioral changes in pregnant women who were previously non-compliant and did not understand the benefits of taking iron tablets, becoming more compliant than before, as evidenced by the research results with a p-value of 0.000 (Aliva et al., 2021). The Ministry of Health recommends that every pregnant woman consume at least 90 Fe tablets during pregnancy with a dose of 60 mg (Fajrin, 2020) . In addition, WHO recommends iron supplementation of 30-60 mg and folic acid 0.4 mg daily as part of routine antenatal care during pregnancy (Kuma et al., 2021) .

Pregnant women with anemia have an increased risk of preeclampsia, the risk of bleeding complications and an increased risk of giving birth by cesarean section (SC) (Hidayanti & Rahfiludin, 2020) . The impact of anemia on babies born includes an increased risk of LBW (low birth weight) and SGA (small for gestational age), increased premature birth, neonatal death, decreased APGAR scores, and decreased mental and motor development of children (Armynia Subratha, 2022) . Pregnant women with anemia are associated with the incidence of anemia in babies born (Risca Fauzia et al., 2021) . Hemoglobin levels in pregnant women are influenced by various factors, but consuming iron tablets can significantly increase Hb levels, if consumed in the right way to increase absorption (Satriani, 2022).

Pregnant women in this study were given educational counseling using attractively packaged leaflets door to door. Detailed education was provided prioritizing the comfort and safety of mothers so that mothers could understand the importance of education on consuming Fe tablets with increased Hb levels and the importance of consuming Fe tablets regularly to prevent mothers from experiencing anemia. Pregnant women who have been given education will be monitored to monitor the compliance of pregnant women in consuming Fe tablets. This will have an impact on the behavior and attitude of mothers to consume Fe tablets regularly and maintain their lifestyle. So that pregnant women who are obedient in consuming Fe tablets can increase Hb levels in pregnant women (Shafriani et al., 2023) . Educational media that is delivered and packaged in an attractive manner has been proven to be able to increase the knowledge and awareness of pregnant women in consuming routine Fe tablets, so that there is an increase in Hb levels in pregnant women. This is in line with previous studies that show the effect of education through Whatsapp Groups on increasing Hb levels in pregnant women and there is a significant difference in Hb levels in two examination evaluations (Sang et al., 2022) . In addition, there were significant changes in hemoglobin levels and the proportion of anemia in pregnant women in the intervention group in the form of nutrition education and counseling who had much better hemoglobin levels than pregnant women in the control group (Wakwoya et al., 2023) . Therefore, pregnant women who are given counseling using the media will increase their knowledge about anemia in pregnancy.

Efforts to prevent and overcome anemia have been carried out by the government and have been standardized through the Regulation of the Minister of Health of the

Republic of Indonesia No. 88 of 2014 concerning the standard for iron tablets for women of childbearing age and pregnant women (Syari et al., 2023) . This effort not only includes the provision of iron tablets during pregnancy or a minimum of 90 tablets, but also emphasizes the importance of counseling, information and education (Ekayanthi & Purnamasari, 2020) .

One of the efforts to overcome the incidence of anemia is to provide health education. Providing health education interventions can have a positive effect on changes in health behavior to prevent anemia and will have an impact on the hemoglobin levels of pregnant women. Health education can change knowledge, attitudes and behavior about preventing anemia during pregnancy where this will form a positive attitude of pregnant women towards the material about anemia that they have just learned, with the consumption of iron tablets can increase Hb levels significantly, if consumed in the right way to increase its absorption (Satriani, 2022) .

Efforts to enhance pregnant women's knowledge and attitudes regarding anemia prevention can also be supported by using engaging and easily understandable media (Amelia et al., 2024). Education about anemia in pregnant women will get good results if using the right media, one of the health promotion methods using visual persuasive message delivery is education using leaflets (Ekayanthi & Purnamasari, 2020) . The effectiveness of using leaflets as a health promotion medium is effective for use as an educational prop on public health issues, so that there is an influence of using leaflets as a medium in carrying out health promotion efforts on community knowledge, attitudes, and behavior towards health behavior (Sutrisno & Sinanto, 2022) . Leaflet media is effective in increasing pregnant women's knowledge about anemia (Fajrin, 2021) . Febriyanti et al., (2022) research shows that direct delivery of information (face to face) accompanied by print media has a positive impact on conveying health messages. Leaflets are important in reinforcing the material delivered verbally because they allow participants to review the information at home.

CONCLUSION

A significant effect was found between the influence of education on iron tablet consumption and increased Hb levels in pregnant women after a 4-week intervention.

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