IMPACT OF IRON SUPPLEMENT TABLET COMPLIANCE ON HEMOGLOBIN LEVELS IN PREGNANT WOMEN

Oleh
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Article History:
Received: 14-06-2025
Revised: 03-07-2025
Accepted: 17-07-2025

Keywords:
Pregnancy,
Anemia,
Blood Supplement Tablet

Abstract: *Iron Supplement Tablets (IST) are utilized to facilitate biological processes in the human body, particularly in hemoglobin synthesis, since the body requires iron minerals from these tablets. IST has 60 mg of iron (in the forms of Ferro Sulfate, Ferro Fumarate, or Ferro Gluconate) and 0.400 mg of Folic Acid. Administering iron supplementation therapy to pregnant women is one of the most effective methods to prevent and address nutritional anemia by elevating hemoglobin levels. This study aimed to assess the impact of adherence to IST consumption and the factors influencing hemoglobin levels in pregnant women. This research employs a quantitative methodology with a prospective design. This study employs a cross-sectional approach, wherein data is collected simultaneously during the distribution of the MARS-5 questionnaire scale. The population of 429 was determined using the Lemes Show formula, yielding 60 respondents. The results indicated that among 60 respondents, compliance among pregnant women was high (1.7%), moderate (90%), and low (8.3%). The study findings indicate that among pregnant women, 41.7% exhibited normal hemoglobin levels, 28.3% had mild anemia, 18.3% presented with moderate anemia, and 8.3% experienced severe anemia. The findings of this study indicated the impact of adherence to IST consumption on hemoglobin levels, with a chi-square test yielding a P-value of (<0.001). Additionally, parity factors influenced compliance with IST consumption, as evidenced by a chi-square test resulting in a P-value of (0.010).*

INTRODUCTION

The maternal mortality rate (MMR) remains a critical issue within the healthcare sector, particularly concerning mother and child health outcomes. According to the World Health Organization (WHO), in 2019, over 295,000 women died due to complications arising from pregnancy and childbirth, with approximately 94% of these fatalities occurring in low-

resource settings. Indonesia's maternal mortality rate is notably higher than that of many of its ASEAN counterparts and significantly exceeds that of other developing nations. Indirect predictors such as anemia significantly influence maternal mortality rates in Indonesia[1].

Infant mortality is closely tied to several factors, including premature birth, low birth weight (LBW), and other interconnected determinants. The process of pregnancy, essential for human reproduction, begins with menstruation when a woman becomes capable of conception, and spans from fertilization to delivery, marking a crucial phase in human development[1]. This period highlights the significance of pregnancy as it encompasses fetal development within the womb. Neglected anemia poses considerable risks for both expectant mothers and their infants. The WHO defines anemia in pregnancy as a hemoglobin level below 11 g/dL or a hematocrit level under 33%. Anemia is characterized by inadequate levels of blood components or key nutrients necessary for red blood cell production, compromising the blood's effectiveness in oxygen transportation to various body tissues[2].

Iron supplementation therapy (IST), which includes iron and folic acid, is known to enhance hemoglobin levels. However, the effectiveness of IST is significantly dependent on adherence to prescribed regimens by pregnant women. Barriers to compliance often include a lack of understanding, adverse side effects such as nausea and constipation, and socio-economic challenges. Pregnant women who do not consistently follow iron supplementation therapy risk experiencing reduced hemoglobin levels, potentially leading to complications such as premature birth and LBW [2,3].

The aim of this investigation is to analyze how adherence to IST impacts hemoglobin concentrations in pregnant women and to identify various influencing factors such as age, education, occupation, and parity. Understanding these relationships is crucial for addressing maternal and infant health crises, particularly in regions with high maternal mortality and infant mortality rates.

METHOD

This research employed a quantitative methodology utilizing a prospective design and a cross-sectional approach. The investigation was conducted at a Primary Health Center. The study group comprised 60 pregnant women who registered their pregnancies at the health center. The research tool utilized was a validated MARS-5 questionnaire, and hemoglobin levels were acquired via laboratory tests documented in medical records. The chi-square test was employed for data analysis to ascertain the correlation between adherence to IST consumption and hemoglobin levels, alongside the impact of variables such as age, education, occupation, and parity on compliance.

RESULT AND DISSCUSION

This study involved 60 pregnant patients who met the inclusion criteria. Data were obtained through laboratory tests recorded in medical records to measure the patients' hemoglobin levels. The research was approved by the Health Research Ethics Committee of Muhammadiyah University of Purwokerto (KEPK-UP) with registration number KEPK/UMP/42/X/2024.

1. Characteristics of Pregnant Respondents

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

Table 1. Characteristics of Pregnant Women Pregnant Women

Characteristics	Frequency	Percentage (%)
Age of Pregnant Women		
20-25 years	19	31,7%
26-30 years	22	36,7%
31-35 years	19	31,7%
Last Education		
Primary	12	20%
Secondary	30	50%
Higher	18	30%
Job		
Working	24	40%
Not Working (IRT)	36	60%
Parity (Number of Pregnancies) At Risk	18	30%
Not at Risk	42	70%

The data in Table 1 shows the characteristics of pregnant patients based on age, where the largest group is the 26-30 years age group with 22 patients (36.7%). The last education level of pregnant women indicates that most have secondary education (equivalent to high school/vocational school) with 30 patients (50%). Employment status shows that the majority of pregnant women are housewives with 36 patients (60%), and parity or the number of births indicates that most are not at risk, with 42 patients (70%).

2. Compliance with Iron Supplement Tablet Consumption

Table 2. Frequency Distribution of Compliance with IST for Pregnant Women

Compliance	Frequency (n=60)	Percentage (%)
High	1	1,7%
Moderate	54	90,0%
Low	5	8,3%
Total	**60**	**100%**

The data from the study indicates that adherence levels to the iron supplement tablet (IST) consumption among pregnant patients, as measured by the MARS-5 compliance scale, reflects a concerning trend. Only 1 patient (1.7%) exhibited high compliance, whereas the vast majority—54 patients (90%)—demonstrated moderate compliance, and 5 patients (8.3%) displayed low compliance. High compliance on the MARS-5 scale is scored at 25, moderate compliance ranges between 6 and 24, and low compliance is categorized with scores from 0 to 5[4]. The findings underscore that the predominant behavior among pregnant women is classified as moderate compliance in IST consumption (90%), with very few achieving high compliance and a small percentage showing low adherence. This adherence is crucial for preventing iron deficiency anemia, which adversely impacts maternal and fetal

health, especially since iron is vital for fetal growth, placental development, and compensating for iron loss during pregnancy. Pregnant women are generally advised to consume IST containing 60 mg of iron and 0.25 mg of folic acid daily for a period of at least 90 days throughout their pregnancy, starting from the first trimester [5].

The study results reveal that a staggering 98.3% of pregnant women fell short of complying with their IST regimen. The primary barriers to effective compliance were identified as side effects such as nausea, feelings of boredom, fear of side effects, and frequent forgetfulness, leading to incomplete adherence to the supplementation[6]. This aligns with previous findings whereby side effects were noted as a significant barrier to adherence among pregnant women taking iron tablets [7,8]. Various internal and external factors contribute to adherence levels. Specifically, patient compliance was notably influenced by their ability to accept medical advice and the adoption of healthy eating habits and physical activity, which are necessary for enhancing compliance with supplementation[9]. In support of this, similar studies have reported that forgetfulness, dislike of medication, and adverse side effects, including nausea and dizziness, were common reasons for non-compliance among approximately 45.8% of pregnant women[10,11]. Further perspectives highlighted by other studies emphasize the challenges faced by pregnant women, including negative perceptions regarding side effects, where concerns regarding large infants and the dislike of the taste and smell of iron tablets were expressed[12].

According to findings from the Ministry of Health, the predominant reasons for non-compliance are forgetfulness, boredom, side effects, and nausea[13]. This view is corroborated by studies from Fitriani et al. and Prasetya, who emphasized that knowledge, family support, and health education play vital roles in improving compliance among pregnant women[14,15]. Thus, addressing the factors leading to low adherence is critical; these include adverse side effects, memory lapses, and lack of support and education. Comprehensive educational interventions regarding the importance of iron supplementation, coupled with family support and effective side effect management, are recommended to enhance compliance in pregnant women [14,15].

3. Hemoglobin Levels in Pregnant Women

Table 3. Frequency Distribution of Hemoglobin Levels in Pregnant Women

Hemoglobin Level	Frequency (n=60)	Persentase (%)
Normal (> 11 g/dl)	25	41,7%
Mild (9 – 10,9 g/dl)	17	28,3%
Moderate (7 – 8,9 g/dl)	11	18,3%
Severe (< 7 g/dl)	7	11,7%
Total	**60**	**100%**

Following the intake of iron supplement tablets (IST), the data indicates that a significant proportion of pregnant women achieved normal hemoglobin levels. Specifically, 41.7% of participants reached the threshold for normal levels, while 58.3% exhibited some degree of anemia, with 28.3% suffering from mild anemia, 18.3% from moderate anemia, and 11.7% from severe anemia. Anemia is defined as having hemoglobin levels below 11 g/dL, which poses risks for both maternal and fetal health[16].

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

The findings align with existing literature that highlights the concerning prevalence of anemia among pregnant populations, often resulting in complications such as low birth weight and developmental challenges for the fetus[2]. The severe forms of anemia are particularly detrimental, as they can adversely affect fetal growth and increase health risks for the mother and infant[17]. Factors contributing to the severity of anemia include inadequate dietary intake, underlying medical conditions, cultural practices, and socioeconomic status[18]. Anemia during pregnancy is primarily associated with the increased iron demand during gestation; unmet nutritional needs can deplete iron stores, raising the likelihood of anemia and its associated adverse outcomes[16]. Therefore, it is essential for pregnant women to be educated about the causes of anemia to enable effective prevention and management[19].

To reduce the risks associated with anemia, it is vital for pregnant women to incorporate iron-rich foods into their diets and adhere to iron supplementation regimens as prescribed by their healthcare providers[2].

4. The Influence of Compliance on Variables

Table 4. Analysis of the Influence of Age on Compliance with Iron Supplement Consumption

Variabel	Kepatuhan Terhadap TTD						Total		P (*Value)*
	High		Moderate		Low				
	f	%	f	%	f	%	f	%	
Hemoglobin Level									
Severe (< 7 g/dl)	0	0,0%	2	3,3%	5	8,3%	**7**	**11.7%**	< 0,001
Moderate (7 -8,9 g/dl)	0	0,0%	11	18,3%	0	0,0%	**11**	**18,3%**	
Mild (9 – 10,9 g/dl)	0	0,0%	17	28,3%	0	0,0%	**17**	**28,3%**	
Normal (> 11 g/dl)	1	1,7%	24	40,0%	0	0,0%	**25**	**41,7%**	
Age									
20-25 years	0	0,0%	18	17,1%	1	1,7%	19	31,7%	0,624
26-30 years	0	0,0%	20	33,3%	2	3,3%	22	36,7%	
31-35 years	2	3,3%	16	26,7%	1	1,7%	18	31.7%	
Last Education									
Elementary School	0	0,0%	10	18,3%	2	3,3%	12	20%	**0,448**
Junior High School	0	0,0%	28	46,7%	2	3,3%	30	50%	
Senior High School	1	1,7%	16	26,7%	1	1,7%	18	30%	
Occupation									
Working	1	1,7%	22	36,7%	1	1,7%	24	40,0%	**0,309**
Not Working	0	0,0%	32	53,3%	4	6,7%	36	60,0%	
Parity (Number of Births)									
At Risk	1	1,7%	13	21,7%	4	5,7%	18	30%	**0,010**
Not At Risk	0	0,0%	41	68,3%	1	1,7%	42	70%	
Total	**1**	**1,7%**	**54**	**90,0%**	**5**	**8,3%**	**60**	**100%**	

The analysis results presented in Table 4 demonstrate the application of a chi-square statistical test involving 60 respondents, which yielded a significance value of P-value = (<0.001), indicating a significant correlation between adherence to iron supplement tablet

(IST) intake and hemoglobin concentrations in pregnant women. Notably, this underscores the critical role that effective compliance with iron supplementation plays in maintaining optimal hemoglobin levels, essential for both maternal and fetal health[20]; . Furthermore, an examination of the influence of age on adherence revealed a chi-square test result of P-value = (0.624), which exceeds the alpha threshold of 0.05, thus indicating that age does not significantly affect compliance among pregnant women[21].

The impact of education on IST consumption similarly resulted in a P-value of 0.448, again exceeding α = 0.05, suggesting that educational attainment does not exert a significant influence on adherence to iron supplementation. Similarly, the analysis of the effect of occupation on IST compliance revealed a P-value of 0.309, indicating no substantial relationship between occupation and adherence to iron supplementation practices[20]; . However, examination of parity—the number of births—yielded a significant P-value of 0.010, highlighting the fact that parity does have a considerable impact on adherence to IST among pregnant women[21].

These results reaffirm the importance of adherence to IST consumption in the prevention and management of iron deficiency anemia, as evidenced by findings that demonstrate a substantial link between compliance and hemoglobin levels[20]; . Previous research corroborates these findings, with one study reporting that 50.5% of pregnant women who did not adhere to IST had a significantly higher anemia prevalence rate of 57.6% (p = 0.000). Another study showed that 43.3% of pregnant women with anemia exhibited limited compliance, with only 6.7% demonstrating adherence, and a statistical analysis indicating p = 0.001. Further evidence indicated that 73.7% of compliant pregnant women had normal hemoglobin levels, in sharp contrast to 53.1% of non-compliant women who suffered from mild anemia (p = 0.022)[21].

Moreover, research highlighted that mothers who consistently adhere to IST show more stable hemoglobin levels. The World Health Organization (WHO) underscores the necessity of compliance with IST to preempt anemia in pregnant consumers, affirming that adherence to iron supplementation markedly influences maternal hemoglobin levels. In this present study, the predominant age group (26-30 years) displayed moderate compliance levels in IST consumption. The nuances of these findings reveal that, while age, education, and occupation do not significantly affect adherence, parity emerges as a critical factor in influencing compliance with iron supplementation[21].

Interestingly, the examination of age suggested that as women age, there appears to be an increase in both compliance and understanding of the importance of iron supplement consumption. Age group trends suggest that older women, possibly due to greater life experience and cognitive maturity, exhibit higher compliance levels with iron supplementation, aligning with statements by the Ministry of Health of the Republic of Indonesia about the positive correlation between cognitive maturity and age. However, some studies conflict with these assertions, reporting significant correlations between age and compliance with iron tablet consumption, indicating the need to explore further the dynamics between maternal age and adherence[20,21].

In conclusion, the data illustrates various factors influencing adherence to IST among pregnant women, highlighting a critical association between compliance and hemoglobin levels while noting that demographic factors like age, education, and occupation were not

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)

significant predictors of adherence. Rather, parity emerged as a significant factor, alongside others such as awareness, familial support, and regular antenatal care (ANC) visits. The overarching implication is that health education and social support are essential in promoting adherence to iron supplementation, thereby mitigating the risks associated with iron deficiency anemia during pregnancy[20,21].

ACKNOWLEDGEMENTS

We would like to express our heartfelt gratitude to the pregnant women who participated in this study and the healthcare professionals who facilitated data collection.

DAFTAR PUSTAKA

[1] Pujihartati SH, Wijaya M, Demartoto A. The Importance of Socializing Maternity Waiting Home in the Attempt of Reducing Maternal Mortality Rate in Wonogiri Regency 2020. https://doi.org/10.2991/icstcsd-19.2020.24.

[2] Rakanita Y, Sinuraya Rano K, Alfian SD, Suradji EW, Suwantika AA, Syamsunarno MRAA, et al. Adherence Does Not Guarantee the Outcome of Iron Supplementation for Reproductive-Age Women With Anemia in West Papua Province, Indonesia: A Quasi-Experimental Study. International Journal of Women S Health and Reproduction Sciences 2023;11:3–10. https://doi.org/10.15296/ijwhr.2023.02.

[3] Yaznil MR, Lubis MP, Lumbanraja SN, Barus MNG, Sarirah M. Comparison of Maternal Outcomes of Daily and Weekly Iron Tablet Supplementation in Pregnant Women in Coastal Region, Medan, Indonesia. Open Access Maced J Med Sci 2020;8:1088–91. https://doi.org/10.3889/oamjms.2020.5056.

[4] Taye TA, Sinaga M, Taye A. Determinants of Adherence to Iron-Folic Acid Supplementation Among Postnatal Mothers in Addis Ababa Referral Hospitals, Ethiopia 2021. https://doi.org/10.21203/rs.3.rs-590351/v1.

[5] Triharini M, Nursalam N, Sulistyono A, Adriani M, Armini NKA, Nastiti AA. Adherence to Iron Supplementation Amongst Pregnant Mothers in Surabaya, Indonesia: Perceived Benefits, Barriers and Family Support. Int J Nurs Sci 2018;5:243–8. https://doi.org/10.1016/j.ijnss.2018.07.002.

[6] Sanghvi T, Harvey PW, Wainwright E. Maternal Iron–Folic Acid Supplementation Programs: Evidence of Impact and Implementation. Food Nutr Bull 2010;31:S100–7. https://doi.org/10.1177/15648265100312s202.

[7] Biru YB, Kiristos AFG, Lemelem GA, Mezen MK. Magnitude and Determinants of Adherence to Iron Supplementation Among Ethiopian Pregnant Women: A Cross Sectional Study From a National Survey 2020. https://doi.org/10.21203/rs.3.rs-17142/v1.

[8] Lacerte P, Pradipasen M, Temcharoen P, Imamee N, Vorapongsathorn T. Determinants of Adherence to Iron/Folate Supplementation During Pregnancy in Two Provinces in Cambodia. Asia Pacific Journal of Public Health 2011;23:315–23. https://doi.org/10.1177/1010539511403133.

[9] Gebremichael TG, Haftu H, Gereziher TA. ≪p>Time to Start and Adherence to Iron-Folate Supplement for Pregnant Women in Antenatal Care Follow Up; Northern Ethiopia</P> Patient Prefer Adherence 2019;Volume 13:1057–63. https://doi.org/10.2147/ppa.s184168.

[10] Ugwu EO, Olibe AO, Obi SN, Ugwu AO. Determinants of Compliance to Iron Supplementation Among Pregnant Women in Enugu, Southeastern Nigeria. Niger J Clin Pract 2014;17:608. https://doi.org/10.4103/1119-3077.141427.

[11] Ba DM, Ssentongo P, Kjerulff KH, Na M, Liu G, Gao X, et al. Adherence to Iron Supplementation

in 22 Sub-Saharan African Countries and Associated Factors Among Pregnant Women: A Large Population-Based Study. Curr Dev Nutr 2019;3:nzz120. https://doi.org/10.1093/cdn/nzz120.
[12] Udho S, Nankumbi J, Namutebi M, Ndeezi G, Epuitai J, Tumwine J. Iron Deficiency Among Pregnant Women Attending an Antenatal Clinic in Northern Uganda: A Cross-Sectional Study 2019. https://doi.org/10.21203/rs.2.14386/v1.
[13] Assefa H, Abebe SM, Sisay M. Magnitude and Factors Associated With Adherence to Iron and Folic Acid Supplementation Among Pregnant Women in Aykel Town, Northwest Ethiopia. BMC Pregnancy Childbirth 2019;19. https://doi.org/10.1186/s12884-019-2422-4.
[14] Sontakke P, Dwidmuthe KS, Kawathalkar A, Bhalerao A. Effect of Mobile Phone Call Reminders With Standard Therapy Versus Standard Therapy Alone on Compliance With Iron Supplementation in Antenatal Women With Iron Deficiency Anemia: A Randomized Controlled Trial. Cureus 2022. https://doi.org/10.7759/cureus.29501.
[15] Alfianti A, Purnamawati D, Nurfadhilah N, Efendi L. The Relationship Between Husband's Knowledge and Support With Fe Tablet Consumption Compliance in Pregnant Women in the Working Area of Cireundeu Puskesmas in 2022. Muhammadiyah International Public Health and Medicine Proceeding 2023;3:423–32. https://doi.org/10.61811/miphmp.v3i1.536.
[16] Kiwanuka TS, Ononge S, Kiondo P, Namusoke F. Adherence to Iron Supplements Among Women Receiving Antenatal Care at Mulago National Referral Hospital, Uganda-Cross-Sectional Study. BMC Res Notes 2017;10. https://doi.org/10.1186/s13104-017-2834-z.
[17] Lamichhane R, Zhao Y, Paudel S, Adewuyi EO. Factors Associated With Infant Mortality in Nepal: A Comparative Analysis of Nepal Demographic and Health Surveys (NDHS) 2006 and 2011. BMC Public Health 2017;17. https://doi.org/10.1186/s12889-016-3922-z.
[18] Gebretsadik S, Gabreyohannes E. Determinants of Under-Five Mortality in High Mortality Regions of Ethiopia: An Analysis of the 2011 Ethiopia Demographic and Health Survey Data. Int J Popul Res 2016;2016:1–7. https://doi.org/10.1155/2016/1602761.
[19] Moucheraud C, Worku A, Molla M, Finlay JE, Leaning J, Yamin AE. Consequences of Maternal Mortality on Infant and Child Survival: A 25-Year Longitudinal Analysis in Butajira Ethiopia (1987-2011). Reprod Health 2015;12. https://doi.org/10.1186/1742-4755-12-s1-s4.
[20] Kareem DO, Abdalla BA, Ezzat R, Taha M, Salih RQ, Jabbar HB, et al. Tracing Hematological Shifts in Pregnancy: How Anemia and Thrombocytopenia Evolve Across Trimesters. Barw Medical Journal 2025;3. https://doi.org/10.58742/bmj.v3i2.171.
[21] Yu C. Policies Affecting Pregnant Women With Substance Use Disorder. Voices in Bioethics 2023;9. https://doi.org/10.52214/vib.v9i.10723.

ISSN 2798-3471 (Cetak)
ISSN 2798-3641 (Online)