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Literature Review: Factors Influencing Knowledge and Compliance in Taking Blood Supplements Among Pregnant Women

Cyntia Wulandari[1*], Dewi Kania Putri Pamungkas[2]

[1,2]*Department of Pharmacy, Faculty of Mathematics and Natural Sciences, Pakuan University, Jl. Pakuan, Tegallega, Bogor City, West Java, Indonesia*

** Corresponding Author. Email: cyntia.wulandari@unpak.ac.id*

ABSTRACT

Anaemia during pregnancy poses significant risks, including fetal growth disorders, maternal complications, and infant mortality. According to data from the World Health Organization (WHO), anaemia remains a major health issue in many developing countries, particularly in pregnant women. This study aims to assess the relationship between knowledge and compliance in taking blood supplement tablets (TTD) among pregnant women at health centres. A literature review was conducted, analyzing studies published between 2019 and 2024, sourced from the Dimension website. The selected articles were relevant to the consumption of TTD among pregnant women and were reviewed to evaluate factors influencing adherence, such as educational level, knowledge, and social behavior. The review showed that while compliance with TTD consumption among pregnant women was generally good, the coverage of the programme was suboptimal due to various obstacles, including limited access to health services and low levels of awareness about the importance of TTD. The distribution of TTD at health centres remains insufficient, and factors such as maternal education, health knowledge, and the behaviour of pregnant women significantly affect compliance. To improve the effectiveness of this programme, there is a need for enhanced education, better accessibility to supplements, and more targeted interventions that address the barriers to compliance.

Keywords:
Health Facilities; Pregnant Women; Compliance; Knowledge; Blood Supplement Tablets

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1. Introduction

Anaemia is a condition in which haemoglobin (Hb) levels in the blood are below normal values, which can lead to various health complications. According to the World Health Organization (WHO), a person is categorised as anaemic if haemoglobin levels are <12 g/dL in non-pregnant women and <10 g/dL in pregnant women or the postpartum period [1]. Data from 2019 recorded maternal mortality at 303,000 cases, with an anaemia prevalence of 48.9% based on Riskesdas 2018 [2]. This shows that almost 5 out of 10 pregnant women in Indonesia are anaemic, which can hurt fetal growth, increase the risk of delivery complications, and lead to maternal and infant death.

Anaemia among pregnant women in Indonesia is higher than in developed countries. The 2018 Riskesdas reported that the majority of anaemia cases occurred among pregnant women aged 15-24 years, with a prevalence of 84.6% [2]. As this incidence rate exceeds 20%, anaemia in pregnant women remains a health issue that needs serious attention [3].

Efforts to prevent anaemia have been made through the provision of blood supplement tablets (TTD) for adolescent girls and pregnant women to prevent iron deficiency that can cause anaemia [4]. Women are more prone to anaemia, especially during menstruation and pregnancy, due to the increased demand for blood plasma. If this need is not met, it can cause bleeding, which results in severe anaemia.

Anaemia-free pregnancy is an important indicator in maternal health services as it has a direct impact on the health of the mother and fetus. The high prevalence of anaemia and the suboptimal coverage of Fe supplementation at Health centers indicate the need for more attention in improving the compliance of pregnant women in taking blood supplement tablets as one of the main interventions in reducing the incidence of anaemia in Indonesia [5].

2. Methods

In this study, the literature review method was used by filtering the year of publication, type of journal article, and free access in PDF form. The time of year used is the last 5 years (2019-2024), published on the Dimension online site related to eating TTD for pregnant women at the health centre. There are 3 relevant journals, and data collection is obtained from previous research results. Through the keywords TTD, Pregnant Women, and Health centers. The literature selection process is illustrated in **Figure 1** using the PRISMA flow diagram.

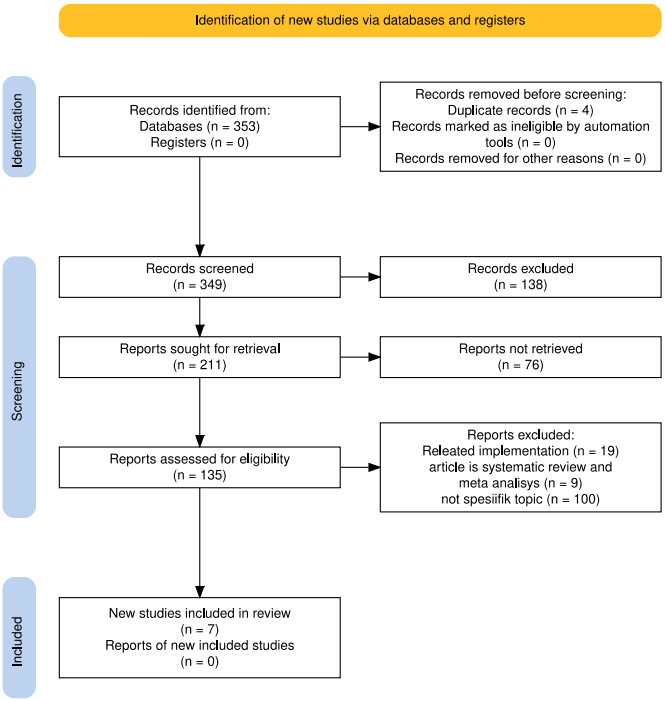

Figure1. PRISMA Flow Diagram of Literature Selection for Pregnant Women's Compliance with Blood Supplements.

This literature review study aims to review the "Relationship between Knowledge and Adherence in Taking Iron and Folic Acid Tablets among Pregnant Women in Health Facilities." The main discussion focuses on the extent to which pregnant women's level of understanding (knowledge) of the importance of nutritional supplementation, particularly iron and folic acid, affects their compliance in taking these

tablets during pregnancy. It is hoped that this study will provide a comprehensive picture of the factors that influence adherence and thus provide strategic recommendations for health workers in improving the effectiveness of iron and folic acid supplementation programmes in health facilities.

Article Search

This study used a Systematic Literature Review (SLR) design to examine "The Relationship between Knowledge and Adherence in Taking Iron and Folic Acid Tablets among Pregnant Women in Health Facilities." The article search was conducted through the Dimensions database with the main keywords: "iron tablets" AND "folic acid" AND "Health Facilities" AND "Pregnant Women," and the addition of "Knowledge" and "Compliance" using AND/OR variations. In addition, the phrase "iron tablets and folic acid tablets" was used to include the local equivalent of "blood supplement tablets," as these terms are not common in the international literature.

From the initial search results, 353 articles were obtained, and 4 duplicate articles were found, so the number of articles that continued to the screening stage was 349. This study uses articles published in the last five years (2019-2024) from the Dimension database, so 138 articles that are outside the time range are excluded, leaving 211 articles. Furthermore, additional criteria for journal articles only (n=61) and open access (n=15) were applied, which excluded a total of 76 articles, so that the number of articles that could still be further examined was 135 articles.

Eligibility Criteria

From the 135 articles, the next step was to apply the inclusion and exclusion criteria. The inclusion criteria included original studies (not systematic review, scoping review, meta-analysis, or protocol) relevant to the topic of "Relationship between Knowledge and Adherence in Taking Iron and Folic Acid Tablets among Pregnant Women in Health Facilities," within the publication range of 2019-2024, and available in *open access* so that it can be fully accessed. On the other hand, the exclusion criteria included articles that focused on "implementation" (n=19), systematic review or meta-analysis type articles (n=9), and articles with non-specific topics on "The Relationship between Knowledge and Adherence in Taking Iron and Folic Acid Tablets among Pregnant Women in Health Facilities" (n=100). After applying the exclusion criteria, 128 articles were eliminated, leaving 7 articles that met the criteria for further analysis.

3. Results and Discussion

The studies selected for this review reveal various factors influencing pregnant women's adherence to blood supplement tablets. These studies highlight compliance rates and the influencing factors, such as education level, health facility visits, and cultural perceptions. The characteristics of the research articles included in this review are summarized in **Table 1**.

From the literature selection process conducted using the PRISMA method, as seen in **Figure 1**, seven journals were selected for analysis in this systematic literature review. These journals discuss various aspects of pregnant women's adherence to taking iron and folic acid (Fe-Folate) tablets, as well as the factors that influence it.

The study by Yassin et al. [1] in Ethiopia found that the compliance rate of Fe-Folate consumption was 66.58%, with the main influencing factors being the mother's education level, knowledge about anaemia and Fe-Folate, number of ANC visits, and counselling by health workers. A similar study by Beressa et al. [2] showed that among pregnant women who received Fe supplementation, the compliance rate was 92.4%, but

only 54% of the total pregnant women received it since the first ANC visit. This study highlights the importance of education and the provision of free supplementation as key factors in improving adherence.

Analysis of Ethiopian national data (EMDHS 2019) by Demie et al. [3] found that of the 60% of pregnant women taking Fe-Folate, only 17.7% reached the WHO recommendation (≥90 days). Factors influencing adherence rates were region of residence, literacy, timing of first ANC visit, and place of delivery. This study suggests that the accessibility of health services and literacy of pregnant women play an important role in improving adherence.

In Kenya, a study by Kamau et al.[4] showed that a community education-based intervention improved pregnant women's knowledge and attitudes towards Fe-Folate, which indirectly improved adherence. Another study in India by Mohan et al. [5] also confirmed that more detailed counselling regarding intravenous Fe-Folate (iron sucrose) therapy improved adherence among pregnant women, from being initially reluctant due to a lack of information or fear of side effects.

In addition, Abdu & Hussein's study [6] highlighted that lack of knowledge about anaemia and the benefits of Fe-Folate supplementation contributed to low adherence in Ethiopia, while the study of Berarti et al. [7] found that factors such as history of anaemia, health worker education, and understanding the benefits of Fe-Folate on infant birth weight also influenced the adherence of pregnant women in taking the supplement.

An analysis of the reviewed journals identified several key factors influencing pregnant women's adherence to iron (Fe)-folate tablet consumption. These factors encompass various aspects, including the pregnant women's knowledge of the benefits of iron supplementation, access to healthcare facilities, and social and cultural support. The following sections provide a detailed discussion of the factors identified in the literature reviewed

Health Knowledge and Education

Pregnant women's knowledge of the benefits of iron (Fe)-folate tablets as an ingredient in blood supplement tablets and the risk of iron deficiency plays a significant role in improving consumption compliance. The study by El-Zeftawy et al. [8] showed that more than two-thirds of pregnant women had low knowledge scores regarding Fe-Folate, which contributed to low adherence. In addition, a study by Khanam et al. [9] in India revealed that the mother's education level, number of visits to health facilities, and knowledge of iron (Fe)-Folate tablets were determinants of adherence. Another study by Kamau et al. [4] also showed that mothers who received education on the side effects of Fe-Folate supplements were more likely to adhere to consumption than those who did not receive similar information.

Access and Distribution of Iron (Fe)-Folate Tablets

Several studies have highlighted that the availability and accessibility of iron (Fe)-folate supplements that serve as blood supplement tablets play an important role in improving adherence. The study by Beressa et al. [2] showed that pregnant women who received supplements for free were more likely to be adherent than those who had to purchase their own. Research in the Philippines by Felipe-Dimog et al. [10] also confirmed that better access to health facilities and equitable distribution contributed to higher adherence rates.

Table 1. Characteristics of Research Articles on Compliance with Iron and Folic Acid Supplementation Among Pregnant Women

Title	Year	Authors and Year	Sample Size	Methods	Country /Region	Analysed Variables	Background	Results	Conclusion
Compliance to iron folic acid consumption and associated factors among antenatal care attendant mothers in southern Ethiopia	2024	Yassin et al. (2024) [1].	378 respondents (quantitative) + 21 participants (in-depth interviews)	Cross-sectional (institution) + qualitative methods	Southern Ethiopia	Anaemia knowledge, IFA knowledge, consumption compliance, ANC visits, cultural factors, family support	Adherence to Fe-Folate tablets remains low, impacting the prevention of anaemia and birth defects. The study aimed to find factors that influence adherence, including timing of ANC registration, education, and maternal knowledge.	The adherence rate was 66.58%. Significant factors: maternal education, anaemia & IFA knowledge, number of ANC visits, fear of side effects, timing of ANC registration, and counselling. Qualitative analysis highlighted behavioural factors, culture, and family support.	Comprehensive education and improved counselling processes are needed to increase pregnant women's adherence to Fe-Folate supplementation.
Utilisation and compliance with iron supplementation and predictors among pregnant women in Southeast Ethiopia	2022	Beressa et al., (2022) [2]	445 respondents	Cross-sectional (community)	Southeast Ethiopia	Anaemia knowledge, Fe supplement utilisation, adherence, socioeconomic conditions, acceptance of free supplements	Anaemia remains a problem for pregnant women. The aim of the study was to evaluate the use of Fe supplements in pregnancy and identify factors that influence adherence.	Only 54% of mothers received Fe at the first ANC visit, but compliance among those who did was high (92.4%). Predictor factors: education, economic status, receipt of free supplements, anaemia & Fe knowledge, health worker visits.	The importance of comprehensive nutrition education and the provision of free Fe to improve both the utilisation and compliance of pregnant women in taking iron supplements.
Adherence to iron supplement intake during pregnancy and associated	2023	Demie et al., (2023) [3]	3927 respondents (EMDHS 2019 secondary data)	Secondary analysis of national	Ethiopia	Fe consumption compliance (≥90 days), area	Iron deficiency in pregnant women results in anaemia, preterm birth, and	Only 17.7% achieved WHO compliance (≥90 days). Significant factors: region, education level,	There is a need for increased education and literacy among pregnant women, as well as

factors in Ethiopia: Further analysis of a national population-based study				data (cross-sectional)		of residence, literacy, education, location of delivery, ANC booking time	LBW. Many pregnant women still do not meet the recommended Fe consumption.	literacy, timing of first ANC visit, and place of delivery.	earlier ANC visits to improve Fe consumption compliance.
Effect of community based health education on knowledge and attitude towards iron and folic acid supplementation among pregnant women in Kiambu County, Kenya: A quasi experimental study	2019	Kamau et al., (2019) [4]	Not mentioned (Quasi-experimental with control/intervention group)	Quasi-experimental (community-based health education)	Kiambu County, Kenya	Fe-folate knowledge and attitudes, impact of community education interventions on adherence	IFA adherence in Kenya is low, largely due to lack of awareness/knowledge. This study evaluated the effectiveness of community-based health education in improving knowledge and attitudes of pregnant women on the use of Fe-Folate supplements.	The intervention showed significant improvement in the knowledge and attitude of pregnant women. This is thought to contribute positively to adherence to Fe-Folate consumption.	Community-based health education can be an effective strategy to improve the knowledge, attitude, and compliance of pregnant women in taking Fe-Folate supplements.
Informing primi and elderly pregnant women about iron sucrose administration for moderate anaemia can improve treatment compliance in public health facilities, Kancheepuram health district, Tamil Nadu, India, 2017: A cross-sectional study	2021	Mohan et al. [5]	350 respondents (5 mothers per 70 clusters)	Cross-sectional (field survey)	Tamil Nadu, India	Adherence to IV iron sucrose administration, level of maternal knowledge (primi- and elderly), perceived safety	IV iron sucrose administration for moderate anaemia has been introduced, but compliance remains low due to lack of information and various beliefs regarding side effects.	Compliance rate was 79%. Factors for non-adherence: lack of information, belief that food is better than injection, and fear of side effects. Providing clear explanations was shown to improve adherence.	Increased education and detailed explanation of iron sucrose in public health facilities helps pregnant women understand and adhere to moderate anaemia treatment.

Pregnant mothers' knowledge, attitude and practice towards prevention of iron deficiency anaemia in Harar town, Ethiopia	2019	Oumer & Hussein, (2019) [6]	128 respondents	Cross-sectional (hospital-based)	Harar, Ethiopia	Knowledge, attitudes and practices towards preventing iron deficiency anaemia (including Fe-Folate consumption), ANC visits	Iron deficiency anaemia remains a serious problem in Ethiopia. Low anaemia prevention knowledge, attitudes and practices are considered to contribute to the high rate of anaemia among pregnant women, including limited Fe-Folate adherence.	It was found that the knowledge and practices of pregnant women in preventing anaemia (including Fe-Folate consumption) are still less than optimal, resulting in a high anaemia burden.	Intensive education, counselling and monitoring of pregnant women's practices are needed to improve adherence to Fe-Folate tablet consumption to reduce the risk of anaemia.
Adherence to iron folic acid supplementation and associated factors among antenatal CARE attending women in Sire district primary health care units, South-East Ethiopia: A facility based cross-sectional study	2023	Berarti et al., (2023)[7]	345 respondents	Cross-sectional (health facility-based)	Sire District, Ethiopia	Fe-folate consumption compliance, knowledge about IFAS & anaemia, history of anaemia, medical advice during ANC, health facility information	Iron deficiency is still associated with various complications. This study aims to determine the level of adherence of pregnant women in consuming Fe-Folate and its supporting or inhibiting factors, especially in primary health facilities.	Compliance was 59.4%. Significant variables: access to information, knowledge of IFAS & anaemia, history of anaemia, medical advice during ANC, timing of visits. Mothers with multiple children tended to have lower adherence.	There is a need to increase information and education by health workers, especially from the beginning of ANC, so that compliance with Fe-Folate consumption is more optimal.

Number of visits to health facilities and counselling by health workers

A higher number of ANC (Antenatal Care) visits at health facilities is associated with higher adherence rates. The study by Demie et al. [3] emphasised that mothers who started ANC visits earlier had higher adherence rates. A similar study by Gebre et al. [11]found that counselling by health workers on the importance of Fe-Folate can significantly improve adherence among pregnant women.

Social and Cultural Factors

Cultural beliefs and family support also play a role in pregnant women's adherence to folic acid supplementation. The study by Mohan et al. [5]found that pregnant women who believed that food was better than Fe-Folate supplements tended to have lower adherence. Meanwhile, a study in Ethiopia by Shumi et al. [12] showed that family support in terms of reminders of tablet consumption contributed to increased adherence.

Side Effects and Palatability of Iron (Fe)-Folate Tablets

Several studies have found that side effects such as nausea, constipation, and bad taste of Fe-Folate tablets are major barriers to compliance. The study by Oriji et al. [13] in Nigeria found that gastrointestinal side effects were one of the main reasons pregnant women did not take Fe-Folate regularly. In addition, a study by Kassa et al. [14] stated that the use of supplements with formulations that are easier to consume can increase the compliance of pregnant women.

Although this review has identified the main factors influencing pregnant women's adherence to Fe-Folate consumption as blood supplement tablets in pregnant women, there are still limitations of the study that need to be considered. The majority of the studies analysed used a cross-sectional design, so cause-and-effect relationships cannot be accurately ascertained. In addition, most of the studies were conducted in developing countries such as Ethiopia and India, which may have different public health challenges from developed countries. Socio-economic and cultural factors have also not been fully elucidated, although studies by Felipe-Dimog et al. [10] and Gebre et al. [11] showed differences in adherence rates based on healthcare access and family support. Therefore, further research with longitudinal or experimental designs is needed to better understand the factors that influence pregnant women's adherence to Fe-Folate consumption across different social and economic conditions.

Iron and folic acid supplementation is vital for preventing anaemia during pregnancy, which can lead to serious maternal and fetal complications. Studies across various regions emphasize that while knowledge of the benefits of supplementation is important, maternal education and access to healthcare play a key role in ensuring adherence. For example, Mishra and Tiwari (2020) found that although most participants in Kathmandu had adequate knowledge about the supplements, counseling was the main factor influencing adherence [15]. Similarly, Simuyemba et al. (2020) in Zambia identified barriers such as long distances to healthcare facilities and the lack of regular antenatal care (ANC) visits, despite high awareness of the supplementation program [16]. Furthermore, Atmadani et al. (2024) highlight the effectiveness of counseling interventions in improving adherence to iron and folic acid supplementation. They found that various counseling methods, including face-to-face counseling, short-term interventions like the 5A approach, and the use of interactive media, significantly

improved adherence rates by providing tailored and consistent support to pregnant women [17].

Moreover, a systematic review by Desta et al. (2019) in Ethiopia revealed that adherence rates were influenced by factors like receiving counseling, having good knowledge about the supplements, early registration for ANC visits, and attending more than four ANC visits . Despite these factors, common barriers such as forgetfulness and fear of side effects still contributed to low adherence [18]. Mishra's study in Nepal further supported these findings, noting that while 85.6% of participants had adequate knowledge, only 78.6% adhered to the supplementation guidelines, demonstrating that education alone is insufficient to ensure compliance. These studies underscore the need for comprehensive interventions that combine education, accessible healthcare, and ongoing support to improve adherence to supplementation programs [15].

4. Conclusion

The results of this literature review highlight that adherence to iron and folic acid (Fe-Folate) tablets remains a significant challenge for pregnant women, particularly in areas with limited access to healthcare services. Key factors influencing adherence include the level of knowledge among pregnant women, the accessibility and distribution of supplements, the frequency of visits to health facilities, and social and cultural influences. The studies analyzed consistently showed that pregnant women who received comprehensive education, frequent health facility visits, and support from healthcare workers and family members tended to have higher adherence rates. The implications of these findings underscore the need for more effective health education programs, broader and more affordable distribution of supplements, and community-based interventions aimed at raising awareness and improving adherence to Fe-Folate tablet consumption among pregnant women. Furthermore, it is crucial to develop policies that ensure better access to healthcare services, particularly for pregnant women in remote or economically disadvantaged areas.

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Conflicts of Interest:

The authors declare no conflict of interest regarding the publication of this article.

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