RESEARCH PAPER

A study on factors influencing compliance of pregnant women to iron and folic acid supplementation in Basrah

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Received: 02.12 .2023 Accepted: 23.12.2023

Abstract

Background: Ensuring compliance to IFA (iron and folic acid) supplementation is crucial in the context of preventing and treating iron deficiency anemia, among pregnant women. This is particularly relevant since the need for iron often begins to rise during the second trimester of pregnancy. The study aimed to evaluate the level of compliance among pregnant women to Iron and Folic Acid Supplementation (IFAS).

Method: This cross-sectional study involved women who had attended six randomly selected primary health care centres in Basrah for antenatal care (ANC). Four hundred pregnant women were included in this study which was conducted from May to August 2023. A special questionnaire form was designed for the study.

Results: the study showed a 59% compliance rate with iron and folic acid among pregnant women who visited primary health care centres in Basrah. The most common reason for non-compliance was "forgetfulness" (24.39%).

The results of this study showed a significant association between the compliance of iron and folic acid and the educational status of women, occupation, gravidity**,** number of live births, Early booking visit time, frequency of antenatal care visits, and previous history of anaemia are significantly associated with compliance to IFAS. compliance is higher among those who take 30 minutes or less to reach the health care centre by walking.

Conclusion: The majority of pregnant women in the second and third trimesters are compliant with IFAS. Being aged 20-29 years, educated, employed, with early booking visits, and Pregnant women with normal current HB levels, and good knowledge about anemia and IFAS were more compliant than others.

Keywords: anemia, pregnant women, compliance, Basrah.

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Introduction

Compliance refers to the act of adhering to the specified dosage regimen.[1] The measurement of compliance may be conducted using direct or indirect methodologies. Direct techniques include several biochemical tests such as haemoglobin, hematocrit, serum ferritin, and stool tests. These methods are known to provide more precise measurements. However, it is important to note that direct methods have some drawbacks, including the need for multiple biochemical tests and the associated economic implications. Indirect measurements included several methods such as direct observation or monitoring of medication use, patient self-reporting, or pill counting conducted by healthcare professionals. Among these direct measurements, the pill count was shown to be the most accurate.[1] Multiple research studies have

shown that compliance to iron and folic acid supplementation (IFAS) is influenced by a range of variables, including sociodemographic characteristics, maternal factors, and health service-related factors. Several factors have been found to have a significant association with compliance to Iron and Folic Acid Supplementation (IFAS). These factors include age[2], educational level[2], gravidity[2], employment status[3]), residence[4], monthly income[3], knowledge of anemia and iron folate tablets[2], number of antenatal care (ANC) visits[4], promptly antenatal care enrollment (4), pills taken when unwell[3], experiences with side effects[3], and history of anemia.[4] According to the World Health Organisation (WHO), around 500 million women of reproductive age throughout the globe are affected by anaemia, with a significant concentration of anemic pregnant women seen on the African continent.[5] Anemia occurring during pregnancy is often identified by the assessment of haemoglobin levels. Mild anemia is recognized when the haemoglobin level falls below 11 g/dL, while moderate anemia is characterised by haemoglobin levels ranging from 7 to 9.9 g/dL. Severe anemia is defined as a haemoglobin level below 7 g/dL.[6] The presence of anemia during pregnancy has been associated with unfavorable maternal and perinatal consequences, such as increased rates of maternal and perinatal death.[7] According to research findings, the implementation of a daily regimen of iron and folic acid supplements (IFAS) throughout pregnancy has been shown to significantly decrease the likelihood of various forms of maternal anemia by 70%, as well as lower the occurrence of iron deficient anemia by 57% at term.[8] Iron deficiency anemia during pregnancy has a negative impact on the health and well-being of both the mother and the fetus and is associated with elevated rates of illness and fetal mortality. Mothers who are affected often exhibit symptoms such as respiratory distress, syncope, fatigue, cardiac arrhythmias, and insomnia.[9] Based on the guidelines provided by the World Health Organisation (WHO) for the control and prevention of micronutrient deficiencies, it is recommended that pregnant women adhere to a standardised regimen of 60 mg of iron and 400 μg of folic acid (IFA) daily. This regimen should be followed for a duration of 6 months, commencing from the first month of pregnancy or upon the initial antenatal visit, and continuing for a period of three months postnatally.[10] Despite the prolonged duration of the iron supplementation program. The lack of compliance is a significant contributing element to the failure in reducing the incidence of anemia among pregnant women. [11,12] The poor efficacy of anemia-prevention programs is believed to be mostly attributed to the limited compliance with iron supplements.[13] Non-compliance to medical recommendations may be attributed to several causes, including patient conduct as well as external circumstances outside the patient's influence.[14] According to the IFAS guideline, women who do not adhere to the prescribed pill consumption may develop a shortage in iron and folic acid (IFA), leading to the occurrence of anemia. This shortfall may have detrimental consequences on both mothers and babies. The occurrence of preeclampsia and premature birth has been shown to be connected with a lack of folic acid in pregnant women. Furthermore, it is important to note that this condition exhibits associations with neural tube abnormalities, fetal malformation, and obesity in neonates.[15] The objective of this research was to evaluate the compliance of pregnant women to iron and folic acid supplementation (IFAS) and identify the

characteristics related to compliance. In this research, we will also investigate the underlying factors contributing to the lack of compliance to Iron-Folic Acid Supplementation (IFAS) protocols.

Method

A cross-sectional study was undertaken to examine pregnant women who had received antenatal care (ANC) at six primary health care centres in Basrah, chosen randomly. The research included 400 pregnant women, and data collection took place over the course of May to August 2023. The research comprised pregnant women in the second and third trimesters who received treatment at primary health care centres in Basrah, namely Al-Bradheea, Al-Seef, Al-Ribat, Al-Junainah, Al-Jihad, and Al-Taamim, between the hours of 9 a.m. and 12:30 p.m. Exclusion criteria included pregnant women in their first trimester, pregnant women afflicted with any chronic disease that impacts their haemoglobin levels, such as haemoglobinopathies, pregnant women who declined participation in the research, pregnant women at their initial visit, and pregnant women below the age of 14. The study utilised a specifically tailored questionnaire to collect data, encompassing various sociodemographic characteristics of pregnant women and their husbands, as well as current obstetrical factors, past medical history, past obstetrical history, knowledge about anaemia and iron, folic acid supplementation (IFAS), haemoglobin level (HB), and the duration required to reach a health care centre by walking. Compliance is formally defined as the female participant adhering to the prescribed regimen of consuming a minimum of five pills on a weekly basis, with a frequency of at least five times per week. [16]

The knowledge was evaluated based on the following criteria:

- **Good Knowledge:** Pregnant women who responded accurately to at least half of the questions pertaining to iron and folic acid (IFA) supplementation and anemia were classified as possessing satisfactory knowledge.
- **Poor Knowledge:** Pregnant women who provided accurate responses to fewer than 50% of the questions were classified as having insufficient knowledge on iron and folic acid (IFA) supplementation and/or anemia.
- The direct measurement of hemoglobin concentration was conducted using a finger prick to obtain a drop of capillary blood. The hemoglobin level results were categorised in accordance with the classification system established by the World Health Organisation (WHO) into:
  - *Normal* $\geq$*11g/dl*
  - *Mild anemia* *10 – 10.9 g/dl*
  - *Moderate anemia* *7 – 9.9g/dl*
  - *Severe anemia* *<7 g/dl*

The haemoglobin findings of the pregnant women were provided to them, and those who were identified as anaemic were then referred for further treatment and interventions. Ethical permission was acquired from the ethical committee at Basrah College of Medicine, the training and development centre, Basrah General Directorate of Health. Additionally, verbal informed consent was obtained from each woman included in the investigated sample. The statistical analysis was conducted using the Scientific Package for the Social Sciences (SPSS) version 26. The statistical significance of the probability value (P-value <0.05) was considered.

Results

Four hundred women were included in the study. Sixty-four percent of pregnant women were between 20-29 years old, 25% of them completed secondary education and 76.5% were housewives. Around two third of husbands aged between 20-29 years old, 30% complete University/ High education and 70% of them are Self-employed. (Table-1).

Table 1. Sociodemographic characteristics of pregnant women and their husbands.

Variables	No.	(%)		No.	(%)
Wife			**Husband**		
Age			**Age**		
<20	58	14.5	<20	11	2.75
20-29	256	64.0	20 - 29	247	61.75
>=30	86	21.5	>=30	142	35.5
Education			**Education**		
Illiterate	19	4.75	Illiterate	7	1.75
Just read and write	52	13.0	Just read and write	65	16.25
Primary	69	17.25	primary	77	19.25
Intermediate	73	18.25	Intermediate	48	12.0
Secondary	101	25.25	Secondary	81	20.25
University/ High Education	86	21.5	University/ High Education	122	30.5
Occupation			**Occupation**		
Housewife	306	76.5	Self-employed	282	70.5
Self-employed	26	6.5	Employee	115	28.75
Employee	**64**	**16.0**	**Student**	**3**	**0.75**
Student	4	1.0			
Total	**400**	**100.0**		**400**	**100.0**

More than half of women are compliant with IFAS (59%), and 41% non-compliant. The most common causes for noncompliance were forgetfulness (24.39%) followed by epigastric pain (15.24%). (Table-2).

Table 2. Compliance with IFAS and causes of non-compliance:

Variable	No.	%
Compliance to IFAS		
Compliant	236	59.0
Non-compliant	164	41.0
Reported causes of non-compliance (N = 164)		
Forgetful	40	24.39
Fetal size increment	12	7.32
Vomiting	13	7.93
Epigastric pain	25	15.24
Diarrhea	3	1.83
Constipation	6	3.66
Dislike the taste	19	11.58
Too many pills	10	6.1
Not believe in the effect	17	10.37
IFAS is not available	19	11.58

The compliance rate among pregnant women aged between 20-29 years old, with secondary education, and housewives are 66.53%, 32.2%, and 66.52% respectively. (Table-3)

Table 3. Distribution of compliance to IFAS by sociodemographic characteristics

A- Women's characteristics	Compliant	Non-Compliant	P-value*
	No. (%)	No. (%)	
Age			
<20	36 (15.25)	22 (13.42)	0.159
20-29	157 (66.53)	99 (60.36)	
≥ 30	43 (18.22)	43 (26.22)	
Education			**0.001**
Illiterate	7(3.0)	12(7.31)	
Just read and write	2(10.2)	28(17.1)	
Primary	25(10.6)	44(26.82)	
Intermediate	43(18.2)	30(18.29)	
Secondary	76(32.2)	25(15.24)	
University/ higher education	61(25.8)	25(15.24)	
Occupation			**0.001**
Housewife	157 (66.52)	149 (90.85)	
Self-employed	23 (9.74)	3 (1.83)	
Employee	54 (22.9)	10 (6.1)	
Student	2 (0.84)	2 (1.22)	

Forty four percent of compliant pregnant women gravid 3-4 times, 70% of them had 1-3 live births, 79% of them in the Third Trimester, 85% of them with early booking visits, and 98% of them had monthly visits to PHC for ANC. (Table-4).

Table 4. Distribution of compliance to IFAS by obstetrical and non-obstetrical factors.

Variables	Compliant	Non-Compliant	P-value*
	No. (%)	No. (%)	
Obstetrical Factors			
Gravidity			**0.001**
1	56 (23.7)	39 (23.8)	
2	66 (28.0)	27 (16.5)	
3-4	103 (43.6)	66 (40.2)	
≥ 5	11 (4.7)	32 (19.5)	
No. of live births			**0.001**
None	64 (27.12)	43 (26.2)	
1-3	166 (70.34)	94 (57.3)	
≥ 4	6 (2.54)	27 (16.5)	
Gestational Age			**0.281**
Second trimester	49 (20.8)	27 (16.5)	
Third trimester	187 (79.2)	137 (83.5)	
Booking visit Timing			**0.04**
< 17 weeks	202 (85.6)	90 (54.9)	
≥ 18 weeks	34 (14.4)	74 (45.1)	
Frequency of antenatal care visits			**0.001**
Every 2 weeks	5 (2.1)	12 (7.3)	
Monthly	231 (97.9)	95 (57.9)	
Every 2 months	0 (0.0)	57 (34.8)	

More than half of women (54.2%) with non-significant past obstetrical history, 35% with anemia in a previous pregnancy, and about 99% planned pregnancy. (Table-5).

Table 5. Distribution of compliance to IFAS by obstetrical and non-obstetrical factors.

Variables	Compliant	Non-Compliant	P-value*
Past medical history			0.128**
Chronic disease present	2 (0.8)	5 (3.0)	
No chronic disease	234 (99.2)	159 (97.0)	
Past obstetrical history			**0.030**
Non-significant	128 (54.2)	122 (74.4)	
Anemia in pregnancy	83 (35.2)	32 (19.6)	
Gestational DM or HTN	4 (1.7)	4 (2.4)	
Previous abortion or infertility	21 (8.9)	6 (3.6)	
Is this pregnancy planned?			**0.032**
Yes	233 (98.7)	130 (79.3)	
No	3 (1.3)	34 (20.7)	

Seventy-two percent of compliant pregnant women had a Good Knowledge about anemia, 67% of them with Good Knowledge about IFAS, 37% with mild anemia and 67% of them reach healthcare center by walking by time less than 30 minutes. (Table-6).

Table 6. Distribution of compliance to IFAS by obstetrical and non-obstetrical factors.

Variables	Compliant	Non-Compliant	P-value*
Non-obstetrical factors			
Knowledge about anemia			**0.01**
Good	212 (89.8)	78 (47.56)	
Poor	24 (10.2)	86 (52.44)	
Knowledge about IFAS			**0.01**
Good	216 (91.5)	54 (32.9)	
Poor	20 (8.5)	110 (67.1)	
Current Hb Level (Mg/dl)			**0.01**
7-9.9	42 (17.8)	66 (40.2)	
10-10.9	76 (32.2)	72 (43.9)	
≥ 11	118 (50.0)	26 (15.9)	
Time to reach the healthcare center by walking			**0.001**
≤ 30 min.	224 (94.9)	44 (26.8)	
> 30 min.	12 (5.1)	120 (73.2)	
Total	236 (100.0)	164 (100.0)	

Discussion

Ensuring compliance to IFA (iron-folic acid) supplementation is crucial in the context of preventing and treating iron deficiency anaemia, particularly among pregnant women. This population group typically experiences an elevation in iron needs beginning in the second trimester. The findings of our research revealed that there was a compliance rate of 59% among pregnant women who visited primary health care centres in Basrah in regard to the consumption of iron and folic acid. This observation is consistent with a prior investigation by Habib et al. in Riyadh, Saudi Arabia, which revealed a compliance rate of 50%.[19] Furthermore, research conducted in the Philippines, including a sample size of 145 pregnant women, revealed a compliance rate of 54%.[20] Similarly, Akaki Kality found a compliance rate of 61%.[20] According to the findings of this research, the primary reason mentioned by pregnant individuals for their lack of compliance to prescribed guidelines was "forgetfulness," accounting for 24.39% of the reported cases. This was closely followed by the occurrence of "epigastric pain" as a side effect, which constituted 15.24% of the reported instances. The provision of support from the spouse and other relatives, via regular reminders to adhere to medication schedules, significantly contributes to enhancing compliance. Additionally, the use of mobile phone reminders may serve as an effective strategy for promoting compliance. It is recommended that women be instructed to use supplements either with a meal or before bedtime. A cross-sectional study conducted in India[21], Ethiopia[22], and Siabani S[23] revealed that the predominant factors contributing to noncompliance among participants were forgetfulness, closely followed by the occurrence of adverse effects. The research conducted in Iran revealed a strong association between compliance and participants aged 20–29 years. This finding suggests that individuals in this age group, particularly pregnant women, may exhibit higher levels of compliance due to factors such as higher education levels, an increased sense of responsibility, and the adoption of healthier behaviours. Additionally, the study also identified a positive link between age and compliance. According to Siabani S.[23] and Nepal.[24] The findings of this research revealed a statistically significant association between the compliance to iron and folic acid supplementation and the educational attainment of women. The results presented in this study align with the research conducted by Siabani S.[23], which demonstrated a favourable association between a higher degree of education and compliance rate. Moms with higher levels of education had a greater understanding of self-care abilities compared to moms with lower levels of education. The association between the occupation of pregnant women and their compliance with iron and folic acid supplementation, as seen in this research, may be attributed to the convenient availability of affordable primary healthcare services. This research examines the compliance rates of pregnant women who are housewives compared to other groups. The findings contrast with the results from a previous study conducted in Dangila, Ethiopia[17], which indicated that pregnant women with government employment were more inclined to adhere to iron-folic acid supplementation. Pregnant women who are experiencing their third or fourth pregnancy and who start early supplementation have a higher level of compliance. This finding aligns with a

previous study done in Dangila, Ethiopia[17], which had similar findings. This research conducted in Dangila, Ethiopia[17] found a strong association between knowledge regarding anaemia and IFAS and compliance with iron and folic acid supplementation.

The current study examined the relationship between compliance with iron and folic acid tablets and the presence of anaemia in pregnant women. It was found that non-anaemic women demonstrated higher levels of compliance compared to anaemic women. Furthermore, a statistically significant association was observed between the anaemia status of pregnant women and their compliance with IFA tablets ($p = 0.00001$). Additionally, the study revealed that women who had experienced anaemia during a previous pregnancy were more likely to exhibit compliance and recognise the advantages of supplementation during a subsequent pregnancy. According to Siabani.[23] The research revealed a strong association between the distance from the main health facility and compliance with iron and folic acid supplementation. Compliance rates were found to be higher among those who were able to reach the health care centre within a walking time of 30 minutes or less. The findings of research conducted in Dangila, Ethiopia[17] exhibited similar outcomes. The research encountered several problems pertaining to obtaining data on pregnant women's compliance levels since it relied on self-reported consumption of iron and folic acid tablets. Consequently, there exists a possibility that pregnant women who did not consume the pills were inaccurately reported. The establishment of comparability was challenging due to the varying definitions of compliance seen across various research projects.

In conclusion, the majority of pregnant women in the second and third trimesters visiting the selected primary health care centers in Basrah in 2023 are compliant with IFAS. Age, education, occupation, time of antenatal booking visit, and frequency of subsequent visits were significantly associated with compliance with the IFAS. Being aged 20-29 years, educated, employed, with early booking visits, and Pregnant women with normal current HB levels, and good knowledge about anemia and IFAS were more compliant than others. The most common causes for non-compliance were forgetfulness followed by epigastric pain.

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دراسة حول العوامل المؤثرة على التزام الحوامل بتناول مكملات الحديد وحمض الفوليك في البصرة

الخلفية: يعد ضمان الالتزام بتناول مكملات الحديد وحمض الفوليك (IFA) أمرًا حاسمًا في سياق الوقاية من وعلاج فقر الدم الناجم عن نقص الحديد بين الحوامل. وهذا له أهمية خاصة لأن الحاجة إلى الحديد غالبًا ما تبدأ في الارتفاع خلال الثلث الثاني من الحمل. تهدف هذه الدراسة إلى تقييم مستوى الالتزام بين الحوامل بتناول مكملات الحديد وحمض الفوليك.(IFAS)

الطريقة: شاركت في هذه الدراسة القطعية نساء حضرن الى ستة مراكز رعاية صحية أولية لغرض الحصول على رعاية ماقبل الولادة تم اختيارهم عشوائيًا في البصرة. وشملت الدراسة التي أجريت في الفترة من مايو إلى أغسطس ٢٠٢٣ أربعمائة حامل. تم تصميم استمارة استبيان خاصة للدراسة.

النتائج: أظهرت الدراسة معدل التزام بنسبة ٥٩٪ بمكملات الحديد وحمض الفوليك بين الحوامل اللاتي زارن مراكز الرعاية الصحية الأولية في البصرة. وكان السبب الأكثر شيوعًا لعدم الالتزام هو "النسيان.(24.39%) "

أظهرت نتائج هذه الدراسة ارتباطًا مهمًا بين التزام الحديد وحمض الفوليك والوضع التعليمي للنساء والمهنة والحمل الحالي وعدد المواليد الأحياء والموعد المبكر لحجز الزيارة وتكرار زيارات الرعاية ما قبل الولادة وتاريخ سابق لفقر الدم. كما أن الالتزام أعلى بين اللواتي يستغرقهن الوصول إلى مركز الرعاية الصحية ٣٠ دقيقة أو أقل سيرًا على الأقدام.

الاستنتاج: تلتزم غالبية الحوامل في الثلثين الثاني والثالث من الحمل بـ مكملات الحديد وحمض الفوليك . فالمرأة التي تتراوح أعمارها بين ٢٠ و ٢٩ عامًا والمتعلمة والعاملة والتي لديها زيارات حجز مبكرة، والحوامل ذوات مستويات الهيموجلوبين الحاليّة الطبيعية، والمعرفة الجيدة بفقر الدم و مكملات الحديد وحمض الفوليك هن أكثر التزامًا من غيرهن.

الكلمات المفتاحية: فقر الدم، النساء الحوامل، الامتثال، البصرة