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Original Article

Factors Influencing Compliance with Iron and Folic Acid Supplements among Pregnant Women at a Tertiary Care Hospital

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ABSTRACT

Background: *Iron and folic acid supplementation (IFAS) is an effective intervention for preventing maternal anemia and improving pregnancy outcomes. However, adherence remains suboptimal in low- and middle-income countries due to multiple socio-demographic, obstetric, and behavioral factors.* ***Objective:*** *This study aimed to assess the level of compliance with iron and folic acid supplementation (IFAS) and identify factors influencing compliance among pregnant women attending a tertiary care hospital.* ***Methods:*** *A descriptive cross-sectional study was conducted from January to March 2026 among 264 pregnant women attending the Department of Obstetrics & Gynecology, Liaquat University Hospital, Hyderabad/Jamshoro. Participants were recruited using purposive sampling. Data were collected using a structured questionnaire and analyzed using SPSS version 23. The Chi-square test was used to assess associations, and $p < 0.05$ was considered statistically significant.* ***Results:*** *Among 264 participants, 61.4% were compliant with IFAS, while 38.6% were non-compliant. Compliance was significantly associated with age, residence, maternal education, husband's education, monthly income, gravida, parity, gestational age at first antenatal visit, and history of anemia ($p < 0.05$). The most common reason for non-compliance was unpleasant taste (21.6%), followed by fear of fetal harm (20.1%) and fear of weight gain (19.7%). Vomiting (31.1%) and gastrointestinal discomfort were the most frequently reported side effects.* ***Conclusion****: Compliance with IFAS was moderate and influenced by socio-demographic and obstetric factors. Addressing misconceptions, improving counseling, and promoting early antenatal care can enhance adherence and improve maternal outcomes.* ***Keywords:*** *Pregnancy; Iron, Dietary Supplements; Folic Acid; Medication Adherence; Anemia, Iron-Deficiency.*

INTRODUCTION

Pregnancy increases the physiological demand for micronutrients essential for maternal and fetal health. Iron and folic acid are particularly important, as iron supports hemoglobin formation and oxygen transport, while folic acid is necessary for DNA synthesis and fetal neural development (1, 2). Deficiency of these nutrients during pregnancy can lead to iron deficiency anemia, preterm birth, low birth weight, and maternal complications (3). Therefore, iron and folic acid supplementation is recommended as a routine component of antenatal care worldwide (4). The World Health Organization (WHO) recommends daily oral supplementation with 30–60 mg of elemental iron and 400 μg (0.4 mg) of folic acid for all pregnant women to prevent maternal anemia, low birth weight, and iron deficiency. This regimen should ideally be initiated as early as possible in pregnancy, preferably at the first

antenatal care visit (5). Socio-demographic, obstetric, and behavioral factors, including maternal education, awareness, antenatal care attendance, and perceived side effects, influence maternal compliance with iron and folic acid supplementation (IFAS) (6, 7). Globally, compliance rates vary widely, ranging from 5.1% in Ethiopia to over 80% in Sri Lanka, with common barriers including forgetfulness, side effects, and lack of awareness (7, 8). In Pakistan, IFAS compliance remains suboptimal. Studies have reported adherence rates of 34.4% in Peshawar, while forgetfulness and side effects were common reasons for non-compliance in Rawalpindi (9). In Sindh, IFAS compliance remains low, with only 37.5% of pregnant women taking supplements and 25.1% adhering for at least 90 days (10). Similar compliance rates (34.4%–38.3%) have been reported in studies from Jamshoro (11). Evidence shows that adherence is associated with maternal age, educational level, gravidity (12), employment status, residence, monthly income (13), knowledge of anemia and iron-folate tablets, antenatal care visits, early registration (14), tablet intake practices and illness behavior (15), experience of side effects, nutritional counseling and family support (15), and history of anemia (16). These determinants have been consistently identified across cross-sectional studies and systematic reviews conducted in different low- and middle-income countries. However, limited evidence exists regarding IFAS compliance and its determinants in tertiary care settings in Hyderabad/Jamshoro. Therefore, this study aimed to assess the level of compliance with iron and folic acid supplementation (IFAS) and identify factors influencing compliance among pregnant women attending a tertiary care hospital in Hyderabad/Jamshoro.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted from January to March 2026 among pregnant women attending the Department of Obstetrics & Gynecology, Liaquat University Hospital, Hyderabad/Jamshoro. Participants were recruited using a non-probability purposive sampling technique. Pregnant women in the second and third trimesters who provided informed consent were included. Women in the first trimester, those with known comorbidities or pregnancy-related complications, and those unwilling to participate were excluded. The sample size (n = 264) was calculated using the single population proportion formula ($n = z^2 \times p\,(1 - p) / d^2$), assuming a 22% prevalence of compliance with iron and folic acid supplementation (IFAS) in Pakistan (17), with a 95% confidence level (Z= 1.96) and 5% margin of error. Data were collected using a structured questionnaire adapted from previous validated studies (18), covering socio-demographic characteristics, obstetric and health-related factors, and compliance with (IFAS) (duration, frequency, reasons for non-compliance, motivating factors, and side effects). Compliance was defined as the intake of ≥4 iron–folic acid tablets per week during the current pregnancy period, while non-compliance was defined as the intake of <4 tablets per week, in accordance with criteria used in previous studies assessing adherence during pregnancy (19). Data were analyzed using IBM SPSS version 23, with categorical variables summarized as frequencies and percentages. Associations between compliance and independent variables were assessed using the Chi-square test, and a p-value < 0.05 was considered statistically significant. Written informed consent was obtained from all participants. Confidentiality and anonymity were strictly maintained throughout the study.

RESULTS

Socio-Demographic Characteristics

A total of 264 pregnant women participated in the study. The age distribution was evenly spread across groups: 34.1% were aged 18–24 years, 31.4% were 25–34 years, and 34.5% were ≥35 years. Slightly more than half (50.8%) resided in urban areas. Regarding education, 34.1% had no formal education, while 25.0% had above-secondary education. More than half (51.1%) belonged to extended families, and 40.2% had a monthly household income below 20,000 PKR (Table 1).

Table 1: Socio-Demographic Characteristics of the Participants (N = 264)

Variable	Category	Frequency (n)	Percentage (%)
Age	18–24 years	90	34.1%
	25–34 years	83	31.4%
	≥35 years	91	34.5%
Residence	Rural	130	49.2%
	Urban	134	50.8%
Education Level	No formal education	90	34.1%
	Primary	53	20.1%
	Secondary	55	20.8%
	Above Secondary	66	25.0%
Family System	Nuclear	129	48.9%
	Extended	135	51.1%
Husband's Education	No formal education	95	36.0%
	Primary	56	21.2%
	Secondary	64	24.2%
	Above Secondary	49	18.6%
Monthly Household Income (PKR)	<20,000	106	40.2%
	20,000–40,000	70	26.5%
	>40,000	88	33.3%
Total		**264**	**100%**

Obstetric and Health-Related Characteristics

More than half of the participants were multigravida (52.7%). A history of abortion was reported by 29.5%, while 32.2% had a history of stillbirth. More than half (56.8%) had current anemia. Less than half (47.3%) had received antenatal care (ANC) during the current pregnancy, and most women initiated ANC in the first or second trimester (Table 2).

Table 2: Obstetric and Health-Related Characteristics of the Participants (N = 264)

Variable	Category	Frequency (n)	Percentage (%)
Gravida	Primigravida	125	47.3%
	Multigravida	139	52.7%
Parity	Nullipara	78	29.5%
	Primipara	98	37.1%
	Multipara	88	33.3%
History of abortion	Yes	78	29.5%
	No	186	70.5%
If Yes, Number of abortions	1	23	8.7%
	2	39	14.8%
	≥3	15	5.7%
History of stillbirth	Yes	85	32.2%
	No	179	67.8%
	1	29	11.0%

If yes, Number of stillbirths	2	22	8.3%
	≥3	34	12.9%
Received ANC	Yes	125	47.3%
	No	139	52.7%
Gestational age at first ANC	First trimester	95	36.0%
	Second trimester	98	37.1%
	Third trimester	71	26.9%
Previous anemia	Yes	145	54.9%
	No	119	45.1%
Current anemia	Yes	150	56.8%
	No	114	43.2%
ANC visits	0–3	74	28.0%
	4–7	102	38.6%
	≥8	88	33.3%
Total		**264**	**100%**

Compliance with IFAS

Out of 264 participants, 61.4% were compliant with IFAS (≥4 tablets per week), while 38.6% were non-compliant (<4 tablets per week) (Figure 1).

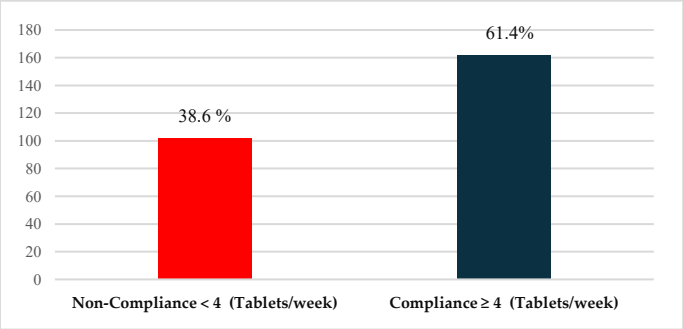

Figure 1: Compliance level with IFAS among pregnant women
IFAS: Iron and Folic Acid Supplementation

Duration of IFAS Use

The duration of IFAS intake varied among participants. The highest proportion used supplements for one month (29.9%), followed by more than three months (25.0%), two months (23.9%), and three months (21.2%) (Table 3).

Table 3: Duration of Iron and Folic Acid Supplementation during Current Pregnancy (N = 264)

Duration	Frequency (n)	Percentage (%)
One month	79	29.9%
Two months	63	23.9%
Three months	56	21.2%
More than three months	66	25.0%
Total	**264**	**100%**

Reasons for Non-Compliance

The most common reason for non-compliance was unpleasant taste (21.6%), followed by fear of fetal harm (20.1%) and fear of weight gain (19.7%). Other reasons included pill burden and forgetfulness (Figure 2).

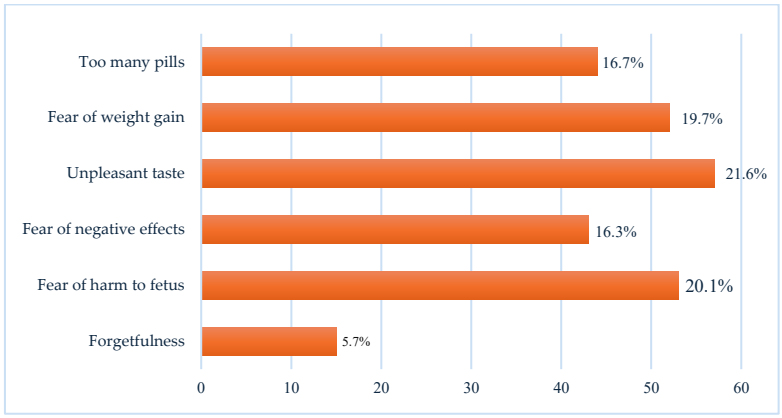

Figure 2: Reasons for non-compliance with IFAS among pregnant women

IFAS: Iron and Folic Acid Supplementation

Factors Influencing IFAS Compliance

Fear of illness was the most commonly reported factor influencing compliance (29.2%), followed by advice from healthcare providers (25.0%) and awareness regarding anemia prevention (18.2%). Free availability of supplements also contributed to adherence (Figure 3).

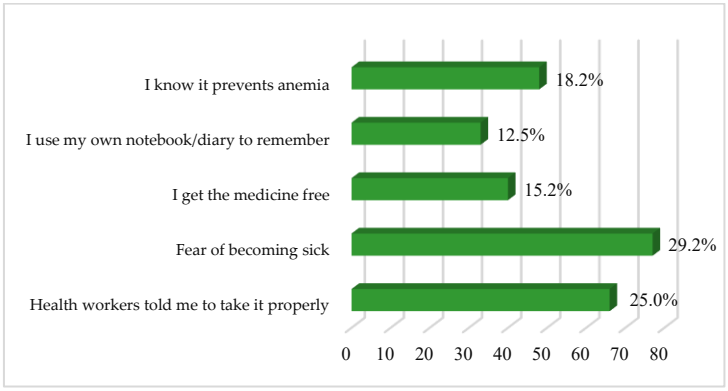

Figure 3: Factors influencing IFAS compliance among pregnant women

IFAS: Iron and Folic Acid Supplementation

Side Effects of IFAS

Vomiting was the most frequently reported side effect (31.1%), followed by diarrhea (26.1%) and heartburn (18.9%) (Figure 4).

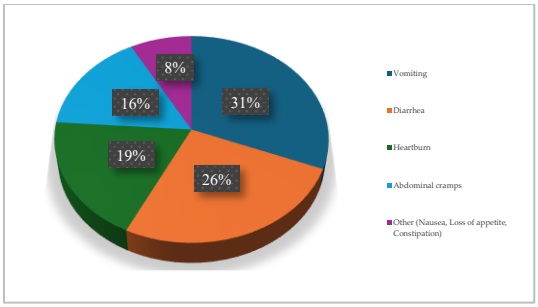

Figure 4: Side effects of IFAS reported by the study participants

IFAS: Iron and Folic Acid Supplementation

Association of Socio-Demographic Factors with IFAS Compliance among Pregnant Women

The Chi-square test showed that age ($p = 0.001$), residence ($p = 0.038$), maternal education ($p < 0.001$), husband's education ($p = 0.003$), and monthly household income ($p = 0.001$) were significantly associated with IFAS compliance. Family system was not significantly associated with compliance ($p = 0.832$) (Table 4).

Table 4: Association of Socio-Demographic Factors with Maternal Compliance with IFAS (N = 264)

Variable	Categories	Compliance ≥4 n (%)	Non-Compliance <4 n (%)	χ^2	df	p-value
Age	18–24 years	68 (41.9%)	22 (21.6%)	13.283	2	0.001
	25–34 years	49 (30.2%)	34 (33.3%)			
	≥35 years	45 (27.8%)	46 (45.1%)			
Residence	Rural	88 (54.3%)	42 (41.2%)	4.327	1	0.038
	Urban	74 (45.7%)	60 (58.8%)			
Maternal education	No formal education	72 (44.4%)	18 (17.6%)	36.874	3	<0.001
	Primary	38 (23.5%)	15 (14.7%)			
	Secondary	29 (17.9%)	26 (25.5%)			
	Above secondary	23 (14.2%)	43 (42.2%)			
Family system	Nuclear	80 (49.4%)	49 (48.0%)	0.045	1	0.832
	Extended	82 (50.6%)	53 (52.0%)			
Husband's education	No formal education	72 (44.4%)	23 (22.5%)	13.994	3	0.003
	Primary	27 (16.7%)	29 (28.4%)			
	Secondary	35 (21.6%)	29 (28.4%)			
	Above secondary	28 (17.3%)	21 (20.6%)			
Monthly income (PKR)	<20,000	80 (49.4%)	26 (25.5%)	14.918	2	0.001
	20,000–40,000	37 (22.8%)	33 (32.4%)			
	>40,000	45 (27.8%)	43 (42.2%)			
Total		162 (61.4%)	102 (38.6%)			

Association of Obstetric and Health-Related Factors with IFAS Compliance

Gravida (p = 0.002), parity (p = 0.018), gestational age at first ANC visit (p < 0.001), and history of anemia (previous and current pregnancy) (p < 0.001) were significantly associated with IFAS compliance. However, abortion history (p = 0.089), stillbirth history (p = 0.442), and ANC attendance (p = 0.277) showed no significant association (Table 5).

Table 5. Association of Obstetric and Health-Related Factors with IFAS Compliance (N = 264)

Variable	Categories	Compliance ≥4 n (%)	Non-Compliance <4 n (%)	χ^2	df	p-value
Gravida	Primigravida	89 (54.9%)	36 (35.3%)	9.689	1	0.002
	Multigravida	73 (45.1%)	66 (64.7%)			
Parity	Nullipara	58 (35.8%)	20 (19.6%)	8.018	2	0.018
	Primipara	56 (34.6%)	42 (41.2%)			
	Multipara	48 (29.6%)	40 (39.2%)			
History of abortion	Yes	54 (33.3%)	24 (23.5%)	2.890	1	0.089
	No	108 (66.7%)	78 (76.5%)			
Number of abortions (among those with a history)	1	15 (9.3%)	8 (7.8%)	4.387	3	0.223
	2	27 (16.7%)	12 (11.8%)			
	≥3	12 (7.4%)	3 (2.9%)			
History of stillbirth	Yes	55 (34.0%)	30 (29.4%)	0.591	1	0.442
	No	107 (66.0%)	72 (70.6%)			
	1	16 (9.9%)	13 (12.7%)	1.546	3	0.672

Number of stillbirths (among those with a history)	2	15 (9.3%)	7 (6.9%)			
	≥3	23 (14.2%)	11 (10.8%)			
Received ANC (current pregnancy)	Yes	81 (50.0%)	44 (43.1%)	1.182	1	0.277
	No	81 (50.0%)	58 (56.9%)			
Gestational age at first ANC visit	1st trimester	61 (37.7%)	34 (33.3%)	18.990	2	<0.001
	2nd trimester	72 (44.4%)	26 (25.5%)			
	3rd trimester	29 (17.9%)	42 (41.2%)			
History of anemia (previous pregnancy)	Yes	67 (41.4%)	78 (76.5%)	31.169	1	<0.001
	No	95 (58.6%)	24 (23.5%)			
History of anemia (current pregnancy)	Yes	78 (48.1%)	72 (70.6%)	12.846	1	<0.001
	No	84 (51.9%)	30 (29.4%)			
Total		**162 (61.4%)**	**102 (38.6%)**			

DISCUSSION

The present study found that maternal compliance with IFAS among pregnant women was 61.4%, indicating moderate adherence. This finding is comparable to studies from Southern Ethiopia (62.8%) and Bangladesh (55–70%) (20, 21), but higher than reports from Pakistan (34.4%) (9). These differences may reflect variations in antenatal counseling, health service delivery, and maternal awareness.

Maternal age was significantly associated with IFAS compliance ($p = 0.001$), with higher adherence observed among younger women (18–24 years: 41.9%). Similar findings have been reported in Ethiopia, suggesting better responsiveness to antenatal counseling among younger mothers (20, 22). Maternal education was also significantly associated with compliance ($p < 0.001$). Interestingly, higher compliance among women with no formal education (44.4%) may reflect greater dependence on antenatal counseling and free supplementation programs, as reported in comparable settings (22, 23). Residence showed a significant association ($p = 0.038$), with slightly higher compliance among rural women (54.3%), possibly due to community-based outreach services (24, 25). Monthly household income was significantly associated with compliance ($p = 0.001$), with higher adherence among lower-income women (49.4%), likely due to reliance on free supplementation programs (23, 26). Husband's education was also significantly associated ($p = 0.003$), supporting evidence that partner involvement positively influences maternal health behaviors (13, 23). In contrast, the family system was not significantly associated with compliance ($p = 0.832$), consistent with findings suggesting that behavioral and socioeconomic factors are more influential (27).

Among obstetric factors, gravida ($p = 0.002$) and parity ($p = 0.018$) were significantly associated with IFAS compliance, with higher adherence among primigravida (54.9%) and nulliparous women (35.8%). Similar findings have been reported in Ethiopia and Sudan (28-30). History of abortion ($p = 0.089$) and stillbirth ($p = 0.442$) were not significantly associated with compliance, consistent with previous studies (20). ANC attendance showed no significant association ($p = 0.277$); however, early initiation of ANC was significantly associated with higher compliance ($p < 0.001$), particularly among women registering in the first and second trimesters. This highlights the importance of early antenatal counseling (31). History of anemia in both previous and current pregnancy was significantly associated with IFAS compliance ($p < 0.001$). Women with anemia showed higher adherence (previous anemia: 41.4%; current anemia: 48.1%), likely due to increased perceived risk and greater counseling exposure, aligned with literature from similar settings (32, 33).

Regarding supplementation patterns, most women used IFAS for only one to three months, indicating suboptimal long-term adherence. Similar patterns have been reported in Pakistan and Tanzania, where continuation beyond three months remains low (9, 34). Major barriers to compliance included unpleasant taste, fear of fetal harm, pill burden, and forgetfulness. Unpleasant taste (21.6%) and fear of

fetal harm (20.1%) were the most commonly reported barriers. These barriers are consistently reported in low- and middle-income countries and remain key challenges to adherence, as reported in previous studies from India and Botswana (35, 36). Facilitators of compliance included fear of illness (29.2%), healthcare provider counseling (25.0%), awareness of anemia prevention (18.2%), and free supplement availability. These findings highlight the critical role of antenatal counseling and health education in improving adherence, observed in similar settings (9, 34, 36).

Common side effects reported were vomiting, diarrhea, heartburn, and abdominal discomfort, similar to findings from studies conducted in Ethiopia, Kenya, and Ghana, where gastrointestinal discomfort was identified as a major contributor to the discontinuation of iron supplementation (34, 37). Overall, maternal compliance with IFAS was influenced by socio-demographic, obstetric, and behavioral factors. Strengthening antenatal counseling, improving maternal awareness, addressing misconceptions, and managing side effects are essential strategies to enhance adherence and improve maternal and neonatal outcomes.

Despite its contributions, the study has several limitations. The hospital-based cross-sectional design limits generalizability and does not allow causal inference. Non-probability purposive sampling may introduce selection bias and affect representativeness. Self-reported data may lead to recall and social desirability bias, potentially overestimating adherence compared with objective measures such as pill counts or biochemical assessment. Additionally, dietary intake and biochemical markers were not assessed, which may influence anemia status and supplementation adherence.

CONCLUSION

Compliance with IFAS in a tertiary care setting was moderate and significantly influenced by multiple socio-demographic and obstetric factors. Barriers to adherence included unpleasant taste, fear of fetal harm, and forgetfulness, whereas antenatal counseling, maternal awareness, early antenatal care registration, and free availability of supplements facilitated compliance. These findings highlight the importance of addressing factors affecting compliance and strengthening antenatal education, correcting misconceptions, and improving management of side effects to enhance maternal adherence and improve maternal and neonatal outcomes.

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