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Original Research Article

Compliance to iron folic acid supplementation among antenatal women attending antenatal clinic in North Kerala: a cross-sectional study

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ABSTRACT

Background: Anemia is a common condition among antenatal women, and the most significant cause of it is iron deficiency. Many countries, including India, have policies to provide iron supplements to them. However, noncompliance is a major obstacle in fighting anemia. Objective was to determine the compliance to iron folic acid supplements and its influencing factors among an antenatal women attending antenatal clinic in a secondary level health care centre in north Kerala.

Methods: A cross-sectional study was conducted among 110 antenatal women attending antenatal clinic in a secondary level health centre in Kannur. Subjects were recruited through consecutive sampling. Data was collected by direct interview using a semi structured questionnaire. Missing >2 doses consecutively was considered as noncompliance. Data was analysed using SPSS 21. Chi-square and Fisher's exact tests were used to find the association of compliance. A p value <0.05 was considered significant.

Results: The mean age of the study population was 26.5±4.59 years. The compliance to IFA supplementation was 79%. Noncompliance was mainly due to forgetfulness (52%) and side effects (44%). Among antenatal women with comorbidities, 61.5% had less compliance compared to those without comorbidities and is statistically significant (p value <0.01). Antenatal counselling had a significant association with compliance (p value <0.001). Antenatal women who received counselling (85.6%) were more compliant.

Conclusions: The compliance to IFA supplementation among antenatal women was 79%. Forgetfulness and side effects were the main factors for noncompliance. The presence of comorbidities was significantly associated with lower compliance, and antenatal counselling was strongly linked to improved compliance.

Keywords: Anemia, Antenatal women, Compliance, IFA supplementation

INTRODUCTION

Anemia during pregnancy represents a significant global health challenge with potentially serious implications for both maternal and child health. It is a leading cause of morbidity and maternal death and can adversely affect social and economic growth.[1,2] According to the World Health Organization (WHO), anemia in pregnant women is defined as a blood hemoglobin concentration lower than 11 gm/dl.[3] The global prevalence of anemia among pregnant women aged between 15 to 49 years is 35.5%, with women of reproductive age showing a prevalence of 29.4%.[3] The National Family Health Survey (NFHS) data reveals a concerning trend regarding the prevalence of anaemia among pregnant women. According to NFHS-5, approximately 52.2% of pregnant women in India are anemic, with states like Kerala reporting a prevalence of 36.3% among this population.[4] This increase from 50.4% in NFHS-4[5] indicates a growing public health challenge despite various initiatives aimed at reducing anaemia rates. Globally and in India, iron deficiency is recognized as the leading cause of anemia in pregnant women.[3,6] Iron deficiency anaemia is associated with postpartum haemorrhage, low birth weight, preterm delivery and fetal

growth restriction.[6] Deficiency to folic acid is associated with health conditions in fetus like megaloblastic anaemia and Neural tube defects.[6-8]

Furthermore, to being necessary for normal health, iron is a vital nutrient that is needed for the synthesis of hemoglobin. During pregnancy, this need rises significantly, and it can often be neglected by a typical diet. Pregnancy-related appetite loss may make this worse. The best way to lower the amount of anemia at term is to increase the concentration of hemoglobin by giving pregnant women tablets containing iron and folic acid. This is the most effective mass intervention for iron supplementation.[8]

To tackle iron deficiency anemia, GOI introduced the National Nutritional Anemia Prophylaxis Programme in 1970. In March 2018, the Ministry of Health and Family Welfare, GOI and UNICEF under POSHAN Abhiyan launched Anemia Mukt Bharath (AMB) to bring down anaemia prevalence among pregnant women.[6,7] Daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron and 400 µg (0.4 mg) folic acid started at second trimester and continued throughout pregnancy and to be continued for 180 days postpartum.[6,9] However, compliance to the iron-folic acid supplements is necessary for the success and effectiveness of such interventions. The degree to which a patient properly follows with medical advice is referred to as compliance.[8] Studies highlight that only a portion of pregnant women consistently adhere to the recommended supplementation regimen and NFHS-4 data has shown low levels of IFA intake.[5,8,10] There is a recognized need for continued research, particularly in different populations and geographic areas within India to understand the barriers to IFA compliance and inform targeted interventions.

Objectives

To determine the compliance to iron folic acid supplements among antenatal women attending antenatal clinic in a secondary level health care centre in north Kerala. To determine the associated factors influencing compliance to iron folic acid supplements among them.

METHODS

Design, setting and study population

A cross-sectional study was conducted among 110 antenatal women aged above 18 years visiting antenatal clinic of secondary level healthcare centre in Kannur district from August 2023 to November 2023.

Inclusion criteria

Pregnant women whose gestational age more than 16 weeks as determined from last menstrual period.

Sample size estimation and sampling method

Compliance was taken as 81.74% according to the study conducted by Debi et al.[11] Z^2pq/d^2, where z=1.96 corresponding to 5% level of significance. Sample size obtained was 81. We have collected 110 study participants and they were recruited by consecutive sampling.

Data collection and analysis

Data was collected by direct interview with the study participants by using semi structured questionnaire which includes socio-demographic details, obstetric variables, details regarding compliance to IFA tablets and OP card was checked for haemoglobin status during the present visit. Data was entered in MS excel and analysed using SPSS version 21. Chi-square and fisher's exact tests were used to find out the association of noncompliance with independent variables. P value of <0.05 was considered as significant.

Operational definition

Non-compliance

Antenatal women who skipped more than 2 tablets per week is taken as non-compliance.

Anemic status

Anemia is considered present if Hb levels <11 gm/dl.[3] Hb levels checked in their OP card during interview.

As per WHO the severity of anemia is classified into three categories: Mild anemia- Hb levels between 9.0-10.9 gm/dl, moderate anemia Hb 7.0-8.9 gm/dl, severe anemia- Hb levels <7 gm/dl.[3]

RESULTS

Demographic profile

Study was conducted among 110 antenatal women above 16 weeks of gestation who are aged above 18years during their visit in antenatal clinic in secondary level health centre. The age of participants ranging from 19 to 40 years with mean age 26.5±4.59 years. Most of them (53.6%) belonged to age category of 19 to 25 years. Majority (46%) of the participants belong to Hindu religion. (49%) of study participants were graduates and (31%) had higher secondary education and (20%) had high school education.

Majority (81%) were house wives. Socioeconomic status was assessed based on modified BG Prasad scale 2024. Most of them belonged to lower middle class 52 (47%) and middle class 47 (43%) as depicted in Table 1.

Table 1: Sociodemographic details of study participants (n=110).

Variables	Categories	Frequency (%)
Age in years	19 to 25	59 (54)
	26 to 32	37 (34)
	33 to 40	14 (12)
Religion	Hindu	51 (46)
	Muslim	47 (43)
	Christian	12 (11)
Socio economic status	Lower	4 (4)
	Lower middle	52 (47)
	Middle	47 (43)
	Upper middle	7 (6)
Educational Status	High school	22 (20)
	Higher secondary	34 (31)
	Undergraduate	42 (38)
	Postgraduate	12 (11)
Occupation	Housewife	89 (80)
	Teacher	8 (7)
	Accountant	3 (3)
	Clerk	5 (5)
	Others	6 (5)

Obstetric profile

Among the 110 antenatal women 57 (52%) were multigravida and 48 (38%) were primigravida. Only 25 (22.7%) had comorbidities like gestational diabetes mellitus, pregnancy induced hypertension and hypothyroidism but majority 85 (77.3%) had no co morbidities as shown in Table 2.

Table 2: Obstetric profile and IFA details of the study participants (n=110).

Variables	Categories	Frequency (%)
Parity	Primigravida	53 (48)
	Multigravida	57 (52)
Comorbidities	Nil	84 (77.3)
	GDM	15 (12.7)
	PIH	6 (5.5)
	Hypothyroidism	5 (4.5)
No. of IFA consumed per day	One	98 (89)
	Two	12 (11)
Side effects of IFA	Present	22 (20)
	Absent	88 (80)
Methods of acquiring IFA	Health facility	87 (79)
	Asha	11 (10)
	Pharmacy	8 (7)
	Anganwadi	4 (4)
Counselling regarding IFA	Received	97 (88)
	Not received	13 (12)

IFA profile

All 110 antenatal women started iron and folic acid supplementation during their first trimester as per physicians' advice. The hemoglobin levels were taken from their OP card during interview. Recent Hb levels were noted, among the 110 antenatal women. Out of this 58% had normal hemoglobin levels and consumed one IFA per day. 39% of them had mild anemia (Hb levels between 10-10.9 gm/dl) and 3% had moderate anemia (Hb levels between 7-9.9 gm/dl). None of the study participants had severe anemia as shown in Figure 1.

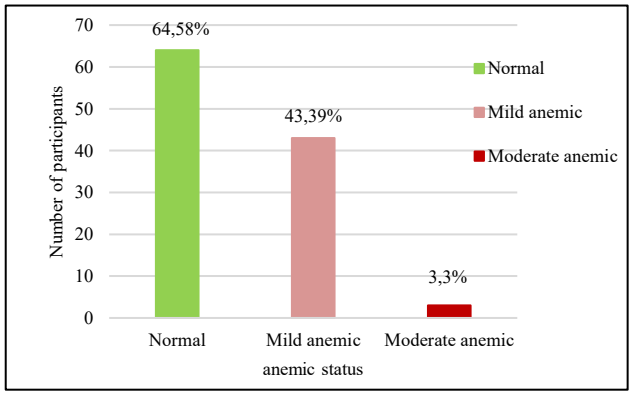

Figure 1: Anemic status of study participants (n=110).

From Table 2, majority 98 (89%) had consumed one IFA tablets per day and 12 (11%) had two IFA per day. Almost 87 (79%) participants had got IFA in health facility, 15 (14%) participants had got IFA from ASHA worker and Anganwadi and 8 (7%) purchased through pharmacy. About 22 (20%) had some sort of side effects of IFA which included vomiting 10 (45.5%), constipation 7 (31.8%) and gastritis 5 (22.7%). Majority 97 (88%) of antenatal women received counselling regarding IFA supplementation and its importance (Table 2). Counselling regarding IFA were given by doctor during their regular antenatal visits in institution and by ASHA or JPHN during their home visits.

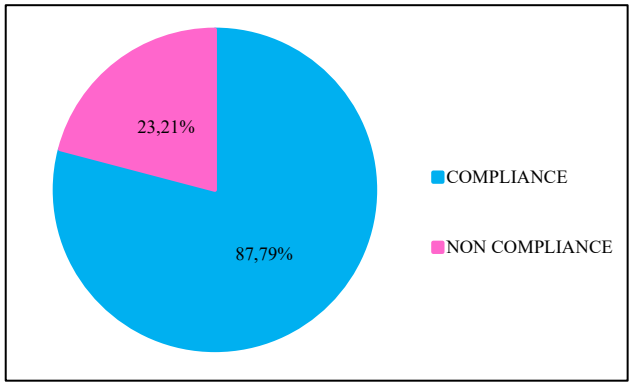

Figure 2: Compliance of IFA among study participants (n=110).

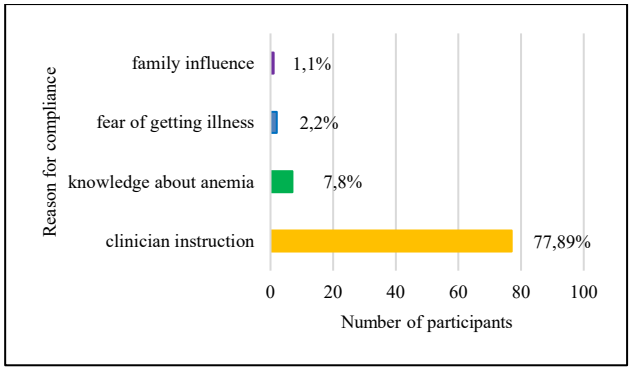

Figure 3: Reason for noncompliance among the study participants (n= 87).

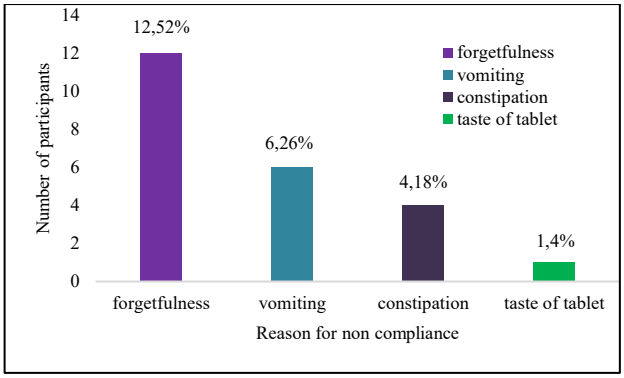

Figure 4: Reason for non compliance among study participants (n=23).

Table 3: Factors influencing the compliance of IFA tablets among study participants (n=110).

Variables	Categories	Compliance (%)	Non-compliance (%)	P value
Age	19 to 25 years	48 (81.4)	11 (18.6)	0.80*
	26 to 32 years	28 (75.7)	9 (24.3)	
	33 to 40 years	11 (78.6)	3 (21.4)	
Education	High school and above	43 (49)	13 (57)	0.72#
	Graduates and above	44 (51)	10 (43)	
Socio -economic status	Lower	4 (100)	0	0.70*
	Lower middle	41 (78.8)	11 (21.2)	
	Middle	6 (85.7)	1 (14.3)	
	Upper middle	36 (76.6)	11 (23.4)	
Comorbidities	Yes	16 (61.5)	10 (38.5)	0.01*
	No	71 (84.5)	13 (20.9)	
Anemic status	Anemic	35 (76.1)	11 (23.9)	0.51*
	Non-anemic	52 (81.3)	12 (18.8)	
Parity	Primigravida	44 (83)	9 (17)	0.23*
	Multigravida	43 (75)	14 (24)	
Side effects	Yes	15 (68.2)	7 (31.8)	0.23#
	No	72 (81.8)	16 (18.2)	
Antenatal counselling	Received	83 (85.6)	14 (14.4)	0.001#
	Not received	4 (30.8)	9 (69.2)	

*- Chi square, #- Fisher's exact t-test

The compliance of IFA among antenatal women was 87 (79%) and noncompliance of IFA was 23 (21%) as shown in Figure 2. Among 23 antenatal women with noncompliance the main reason was forgetfulness 12 (52%) followed by side effects such as vomiting 6 (26%), constipation 4 (18%) as shown in Figure 4. Antenatal women with co-morbidities had less compliance compared to those with no co-morbidities and it was statistically significant (p value- 0.01). There was a significant association between antenatal counselling and compliance (p value- 0.001). Antenatal women who received antenatal counselling (85.6%) were more compliant compared to those who did not receive counselling. Age, parity, educational status, anemia and side effects to IFA had no significant association with noncompliance as depicted in Table 3.

DISCUSSION

Study was conducted among 110 antenatal women above 16 weeks of gestation visiting antenatal clinic in secondary level health care centre. The mean age of the study population was 26.5±4.59 years. The majority (53.6%) were within the 19-25-year age group. This age distribution is consistent with national trends reported in the National Family Health Survey (NFHS-5), where the majority of pregnant women are in their twenties.[4] All the participants (100%) were literate. The majority of participants (81%) were housewives, and most belonged to lower middle (47%) or middle (43%) socioeconomic classes, as per the modified BG Prasad scale.

In this study, 52% of women were multigravida and 38% were primigravida. This distribution is comparable to a study by Mithra et al found a similar proportion of multigravida women.[8] The anemia profile revealed that 58% had normal hemoglobin levels, 39% had mild anemia, and 3% had moderate anemia, with no cases of severe anemia. Nationally, NFHS-5 reports showed that 52.2% of pregnant women in India are anemic (Hb<11 gm/dl), with Kerala reporting 31% of lower prevalence compared to the national average.[4,6] The lower rates of moderate and severe anemia in this study reflect the influence of literacy in controlling anemia. All women were literate in this study. This shows that Kerala's healthcare system is operating effectively and that healthcare providers regularly provide counselling.

Considering current national and World Health Organization (WHO) guidelines, all participants in this study began consuming IFA supplements in the first trimester.[12] The majority (79%) obtained their supplements at the healthcare facility during their routine visit, and they took one IFA tablet daily. A lesser percentage obtained their supplements via pharmacies, Anganwadi centres, or ASHA workers. Majority 97 (88%) of antenatal women received counselling regarding IFA supplementation and its importance during their regular antenatal visits in institution and by ASHA or JPHN during their home visits. This Counselling interventions directly increase knowledge about the importance of IFA supplementation, the risks of anemia, and the benefits for both mother and child.

In this study the compliance rate was 79% for iron and folic acid (IFA) supplementation among antenatal women attending a secondary-level health centre in North Kerala. This finding is relatively high compared to several other studies conducted in similar settings.[8,10,13,14] For instance, a study by Mithra et al in coastal south India reported a compliance rate of 64.7% among pregnant women.[8] In another Indian study by Debi et al, compliance was reported at 81.74%, which is comparable to the present study's findings.[11]

In this study, forgetfulness (52%) and side effects (20%), including constipation, vomiting, and gastritis, were the main causes of non-compliance. These results are supported by national and international research, which regularly emphasizes forgetfulness and gastrointestinal side effects as important factors affecting compliance.[8,10,11,13,15] This pattern highlights the significant role of memory lapses in daily medication routines among antenatal women. Only 22.7% of participants had comorbidities, such as gestational diabetes, pregnancy-induced hypertension, or hypothyroidism, while the majority were free of comorbid conditions. Among those with comorbidities, 61.5% had less compliance compared to those with no comorbidities. It is statistically significant (p value <0.01). This is similar to several studies done by Nisar et al, Gebreamlak et al in Ethiopia Ugwu et al in Nigeria, who reported that pregnant women with comorbidities often face additional pill burden and may experience more pronounced side effects, leading to reduced compliance.[16-18] Similarly, a study by Mithra et al reported that women with multiple health issues tended to prioritize medications for acute or symptomatic conditions over preventive supplements like IFA.[8] Majority 97 (88%) of antenatal women received counselling regarding IFA supplementation and its importance. Antenatal counselling had a significant association with compliance (p value <0.001). Antenatal women who received counselling (85.6%) and followed clinician instruction (89%) were more compliant, which is similar to other studies by Roy et al and Khanam et al.[19,20] A systematic review by Atmadani et al showed women received counselling or health education were twice as likely to adhere to IFA compared to those who did not.[21] Our finding also supported by NFHS 5 data showed that women with more ANC visits and doctor-led care have better IFA consumption.[4] The presence of side effects, age, parity, educational status, and anemic status did not significantly associated with non-compliance; however, women who did not experience side effects were more likely to comply.

The research was conducted in a single secondary-level health centre in north Kerala and limits the generalizability. We did not carry out pill counting or other objective methods for checking the compliance and compliance was measured as per the self reported by the pregnant women.

CONCLUSION

The present study observed that 79% of the antenatal women compliant to iron folic acid supplements. Forgetfulness and side effects were the main factors for noncompliance. The presence of comorbidities was significantly associated with lower compliance, and antenatal counselling was strongly linked to improved compliance.

Recommendations

To provide additional family support, specialized counselling and follow up for antenatal women with comorbidities, as they are at higher risk of non-compliance and may require more personalized care. Can implement reminder systems such as SMS alerts, pill boxes and family-based reminder to address forgetfulness. Offer guidance on managing side effects and encourage women to report symptoms so that timely interventions can be provided.

Strengthening antenatal counselling and incorporate IFA compliance checks during their regular hospital visits and community visits. Future research with larger, multi-centre samples, objective compliance measures, and longitudinal follow-up is recommended.

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