Patient Preference and Adherence

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Time to start and adherence to iron-folate supplement for pregnant women in antenatal care follow up; Northern Ethiopia

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Background: Iron folate supplementation is a cost-effective way of reducing iron deficiency anemia, low birth weight, and neural tube defects in resource-limited countries like Ethiopia. Late to start and poor adherence to iron-folate supplement has restricted its effectiveness. The aim of this study was to determine the time to start and adherence level of iron-folate supplementation to pregnant women attending at the Ayder Comprehensive Specialized Hospital.

Methods: Two hundred pregnant women were recruited in cross-sectional study design between February and April 2018.

Results: From the total participant pregnant women the urban dweller constituted the major proportion of 182 (91%). Seventy-eight (39%) of the participants had two antenatal care visits, whereas only, 21 (10.5%) of them had an antenatal care visit three and above. One hundred fifty-five (77.5%) participants women had knowledge about the cause of anemia in pregnancy. In this study, 143 (71.5%) of the pregnant women started their iron folate supplement in the second and third trimester. The adherence of iron folate intake was 10.5%. Healthcare education and counseling about iron-folate supplementation (AOR =4.55, 95% CI =[1.534, 13.512]), number of pregnancies (AOR =6.941, 95% CI = [1.511, 31.09]), and number of antenatal visit (AOR =0.242, 95% CI =[0.069, 0.852]) were significantly associated with adherence to iron-folate supplementation.

Conclusion: Time to start iron folate supplement in the first trimester was low and the adherence level was also very poor, which can be attributed by the number of antenatal care visits, frequency of pregnancy and healthcare education and counseling about iron folate supplement.

Keywords: adherence, iron-folate supplementation, anemia, Ethiopia, right time to start

Background

The World Health Organization (WHO) estimates the number of anemic people worldwide to be around 2 billion where approximately 50% of all anemia can be attributed to iron deficiency.[1] The global prevalence of anemia is still high in pregnant women (48.2%) as compared with non-pregnancy (30.2%). Similarly, the prevalence of anemia significantly varies, ranging from 24.1% in America to 57.1% in Africa.[2–4] In Ethiopia, a higher proportion of pregnant women are anemic (22%).[5]

Early antenatal iron-folate supplementation reduces iron deficiency anemia, preterm birth, early neonatal death, and low birth weight among pregnant women.[5] WHO

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has recommended a 6-month regimen of a daily supplement containing 60 mg of elemental iron along with 400 mcg of folic acid for all pregnant women. In areas with a higher prevalence of anemia, it is recommended that supplementation continues for three months postpartum.[6] Similarly, the Ethiopian national guideline for control and prevention of micronutrient deficiencies endorsed the above prevention protocol.[7] Despite this program, in Ethiopia, 0.3–0.4% of pregnant women took iron folate supplement for the recommended period (90 days or more) during their pregnancy[5] Where, the WHO recommendations were not met due to poor adherence to iron-folate supplement, not refilling regularly.[8]

Pregnant women were not fully adhered to their iron folate supplement because of many factors including prescribing large doses, fear of side effects, loss of awareness about the antenatal care (ANC) follow up, forgot taking medications at regular time, irregular ANC follow up, insufficient health education, number of tablets dispensed during ANC follow up, access to supply and scares of health facility and others leading to persistent high prevalence of anemia in pregnant women.[2,5,9,10] The right time to start as well as adherence to iron-folate use was not studied and there is a paucity of data in referral and teaching hospitals. So, the objective of this study was to time to start and the level of adherence of iron folate supplement among pregnant women attending antenatal care at tertiary, referral and teaching hospital, Ayder Comprehensive Specialized Hospital (ACSH), Mekelle, Northern part of Ethiopia.

Methods

This study was conducted at the Ayder Comprehensive Specialized Hospital, tertiary teaching, and referral hospital, which has a catchment capacity to 8 million peoples in the Northern part of Ethiopia. The source population of this study was all pregnant women attending ANC follow up at ACSH and the study subject was all pregnant women taking iron-folate supplementation from the study area during the index period from January to April 2018. The inclusion criteria for this study were pregnant women who have at least one ANC follow up after the first visit, taking iron folate supplement and volunteers to interview. Pregnant women who were critically ill, age less than 18 years, taking their iron folate during the first visit, could not hear or speak and those with mental disorders were excluded from the study.

The sample size was determined based on the single population proportion formula using a 95% confidence interval, 5% margin of error, and an assumption that 28.9% of pregnant women were adherent to iron-folate supplement.[11] In this study, the expected study subjects in three months were 480 considered as study population which was less than 10,000. From the registration of the hospital of 2017 GC during similar three months, 480 pregnant women had service at the study setting. By using the above data, the correction sample formula, N=480, n=350 the corrected sample size was = n x N/n+ N, 202 study subjects were required. To compute for the non-response rate, 10% of the total sample was added to make the total study subjects 222. All pregnant women who fulfill the inclusion criteria were considered without sampling.

A facility-based interview-structured questionnaire was developed by compiling a number of questions adapted from similar study materials, review of relevant literature and articles that could address the objective of the study.[2,11,12] The questionnaire was designed in English and translated into Tigrigna (a local language). In order to maintain the original meanings of the Tigrigna, version questionnaire was translated back into English. The Tigrigna final version was pretested on a sample of 15 pregnant women attending ANC and using iron folate supplement in neighbor district Mekelle General Hospital. The questionnaire consisted of items that assess sociodemographic characteristics, time to start and adherence to iron-folate supplement, knowledge of anemia and iron-folate supplement, pregnancy-related experiences. For ethical consideration in addition to accepting verbal consent, the confidentiality of participant data was maintained by using code instead of name and card number.

The data was checked and cleaned for completeness and consistencies then coded, entered using Epi-Data version 3.1 and analyzed using SPSS version 21. Simple descriptive analysis was used to show the frequencies and percentage of variables. A binary logistic regression analysis was made to obtain an association between the risk factors and adherence of iron-folate supplementation. The strength of statistical association was measured by adjusted relative risk and 95% confidence intervals. Statistical significance was declared at $P<0.05$ and variables that showed statistically significant association ($P<0.05$) in the bivariate analysis were included in the final model.

Adherence was considered as pregnant women taking iron folate supplement seven tablets per week to attain adherence of greater than 90%[5,7,13,14]

Non-adherence: Pregnant women taking iron folate less than seven tablets per week[14,15]

Results

Socio-demographic and pregnancy characteristics of pregnant women

From the total pregnant women, the urban dweller constituted the major proportion of 182 (91%). The age range distribution was 6 (3%) 18–20 years, 139 (69.5%) 20–35 years, and 55 (27.5%) greater than 35 years old. Greater than half of the study participants' 112 (56%) had a family size in the range of four up to six. Table 1

Out of the interviewed study participants, 78 (39%) of them had two ANC visits, only 21 (10.5%) of them had ANC visit four and above. One hundred twenty-four pregnant women (62%) started their ANC follow up at the gestational age of ≥16 weeks, whereas 76 (38%) of the pregnant women started their ANC follow up at the gestation of <16 weeks. The majority of the pregnant women 144 (72%) had 2–4 times pregnancy and 36 (18%) of were pregnant ≥5 times. One hundred eighteen (59%) of them had 2–4 deliveries while 52 (26%) had only one delivery. Table 1

Table 1 Socio-demographic and pregnancy characteristics of pregnant women on iron folate supplement at Ayder Comprehensive Specialized Hospital, Mekelle, Ethiopia, 2018

Characteristics	Number (N)	Percent (%)
Marital status		
Single	1	0.5
Divorced	16	8.0
Married	183	91.5
Family size		
1–3	78	39.0
4–6	112	56.0
>6	10	5.0
Age in years		
18–20	6	3.0
20–35	139	69.5
≥35	55	27.5
Residence		
Urban	182	91.0
Rural	18	9.0
Occupation of women		
Housewife	83	41.5
Marchant	73	36.5
Government employee	36	18.0
Private	6	3.0
Laborer	2	1.0
Number of antenatal care visit		
One	50	25.0
Two	78	39.0
Three	51	25.5
Four and above	21	10.5
Gestational age ANC started (weeks)		
<16	76	38.0
≥16	124	62.0
Frequency of pregnancy		
1	20	10.0
2–4	144	72.0
≥5	36	18.0
Frequency of deliveries		
0	20	10.0
1	52	26.0
2–4	118	59.0
≥5	10	5.0

Abbreviation: ANC, antenatal care.

Knowledge of the pregnant women on anemia and iron-folate supplement

One hundred fifty-five (77.5%) of the pregnant women had knowledge about the cause of anemia in pregnancy, but 45 (22.5%) of them had no knowledge about the cause of anemia in pregnancy. The majority of the study participants, 193 (96.5%) know the type of supplement took during their ANC follow up and 183 (94.8%) of the study participants know the benefit of iron folate supplement. Prevention maternal death 104 (52%), preventing infant mortality 72 (36%), increasing maternal blood 60 (30%) and prevention of birth defects 47 (23.5%) were among the benefits of iron folate use indicated by the participants. One hundred seventy-nine (89.5%) participants had knowledge about the risk of iron-folate supplement. Harming fetus growth 128 (64%), causing fetus big weight 108 (54%) were among the major risks reported. The source of information of the study participants from 105 (52.5%) from health workers, 34 (17%) from their friends and 28 (14%) from media. Table 2

The right time to start and adherence to iron-folate supplement

In this study 6 (3.0%) of the study participant started their iron folate supplement within one month after conception, whereas 143 (71.5%) of them started their iron folate supplement in the second and third trimester. Adherence, which was considered as taking iron folate supplement seven tablets per week during the study period, one hundred seventy-nine participants (89.5%) took iron folate

Table 2 Knowledge of participant women on anemia and iron folate supplement at Ayder Comprehensive Specialized Hospital, Ethiopia, 2018

Variable	Number (n)	Percentage (%)
Knowledge on the cause of anemia in pregnancy		
Yes	155	77.5
No	45	22.5
Knowledge on prevention of anemia during pregnancy		
Yes	172	86.0
No	28	14.0
Knowledge on the drug iron folate		
Yes	193	96.5
No	7	3.5
Knowledge on the benefit of iron folate supplement		
Yes	183	94.8
No	10	5.2
Prevent maternal death	104	52.0
Prevent infant mortality	72	36.0
Prevent birth defect	47	23.5
Increase maternal blood	60	30.0
Give maternal strength	8	4.0
Knowledge on the risk of iron/folate supplement		
Yes	179	89.5
No	21	10.5
Harm fetus growth	128	64.0
Cause fetus big weight	108	54.0
Result in a complicated delivery	21	10.5
Source of information about iron folate		
Health workers	105	52.5
Media	28	14.0
Friends	34	17.0
Health education and counseling about iron/folate supplement during collection		
Yes	159	79.5
No	41	20.5

supplement for their pregnancy less than seven tablets per week, whereas 21 (10.5%) of pregnant women took seven iron folate tablets per week. In the assessment of reasons for taking less than seven tablets per week, 133 (66.5%) reported long waiting time in the health facility during collecting their supplement, 110 (55%) forget fullness, followed by 85 (42.5%) fear of big weight and 61 (30.5%) fear of side effects. Heartburn 72 (36%) and vomiting 26 (13%) were the two most common side effects reported. Almost all 189 (94.5%) participants had problems in the health facility during supplement collection. Table 3

Factors associated with adherence to iron-folate supplement

Being residence in urban had a protective effect against non-adherence in bivariate analysis (COR (crude odds ratio) =0.180, P=<0.05, CI=(0.059–0.547). But, its association was not statistically significant in the multivariate

Table 3 The right time to start and adherence to iron-folate supplement at Ayder comprehensive Specialized Hospital, Mekelle, Ethiopia, 2018

Variables	Number (N)	Percentage (%)
Time to start ion folate supplement		
First trimester (0–4 weeks)	6	3.0
First trimester (5–13 weeks)	49	24.5
Second trimester (14–26 weeks)	78	39.0
Third trimester (27–40 weeks)	65	32.5
Adherence for iron folate supplement per week		
Less than seven tablets	179	89.5
Seven tablets	21	10.5
Reasons for taking less than seven tablets per week		
Forget fullness	110	55.0
Because of too many pills	13	6.5
Fear of side effects	61	30.5
Unpleasant taste	13	6.5
Fear of big weight	85	42.5
Lack of information about iron folate	1	0.5
Long waiting time	133	66.5
Poor professional communication	62	31
Side effect iron folate supplement reported		
Vomiting	26	13
Diarrhea	17	8.5
Constipation	14	7
Heartburn	72	36
Abdominal cramp	6	3
A problem in the health facility during collection		
Yes	189	94.5
No	11	5.5
Shortage of supplement	16	8
Long waiting time	133	66.5
Poor health provider communication	62	31

analysis (AOR=0.296, *P*=075, CI (confidence interval) = (0.078–1.132)). Pregnant women who got health education and counseling were four times greater adherent to their supplement than pregnant women who did not get health education and counseling (AOR (adjusted odds ratio) =4.55, *P*=0.006, CI =(1.534–13.512)). Study participants who had pregnancy for the third time (AOR=6.94, *P*=0.013, CI= (1.511–31.890)) were almost seven times adherent to their supplement compared to women who were pregnant for the first time. Study participants who had two times ANC visit were 24% greater to adhere to their iron-folate supplement when compared to one ANC visit (AOR=0.242, *P*=0.027, CI=(0.069–0.852)). Health education and counseling, the number of ANC visits and frequency of pregnancies were independent variables which statistically associated with adherence at *P*<0.05 Table 4.

Discussion

In the current study, three-fourth of the pregnant women started their iron folate later than the recommended time to start iron folate supplement in the first trimester. The goal of iron folate supplement might not be accomplished since the neonatal development is crucial in the first trimester and neural tube defects will not be prevented.

Despite the high burden of anemia in pregnancy in low resource setting and effectiveness of antenatal iron-folate supplementation, in this study, only 10.5% of participants have fully adhered to iron-folate supplement. This finding is consistent with the study done in Uganda 11.6%[16] and significantly lower than that of the study done in Mecha, Western Amhara 20.4%,[11] Scandinavia 27%[17] and Misha, South Ethiopia 39.2%.[2] The difference in adherence level might be due to the difference in the study setting, using different (50–90%)[18,19] cut points for adherence levels. In this study adherence to iron, folate was defined as a participant taking seven tablets of iron folate per week during the study period to attain the WHO goal of iron folate supplement 90 plus intakes during their pregnancy. To prevent poor maternal-fetal outcome the Ethiopian Ministry of Health should adopt a 90 plus iron folate tablets intake during their pregnancy, since a number of studies shown that only about 8% pregnant women were taking iron folates for more than 90 days which is the optimal iron folate supplement.[20]

In the current study, pregnant women who had two times ANC visit were 24% greater to adhere to their iron-folate supplement when compared with those who had one ANC visit. This finding was supported by the study conducted in the North Western Zone of Tigray, Ethiopia.[11]

Table 4 Factors associated with adherence to iron-folate supplement at Ayder Comprehensive Specialized Hospital, Mekelle, Ethiopia, 2018

Variables		Adherence				
		Yes	No	With 95% CI		*P*-values
		N (%)	N (%)	COR	AOR	
Residence	Urban	15 (8.2)	167 (91.8)	1	1	
	Rural	6 (33.3)	12 (66.7)	0.180 (0.059–0.547) *	0.296 (0.078–1.132)	
Health education and counselling	Yes	11 (6.9)	148 (93.1)	4.34 (1.696–11.109) *	4.55 (1.534–13.512) *	0.006
	No	10 (24.4)	31 (75.6)	1	1	
Family size	1–3	14 (17.9)	64 (82.1)	1	1	
	4–6	6 (5.4)	106 (94.6)	0.259 (0.095–0.707) *	1.807 (0.037–88.394)	
	>6	1 (10.0)	9 (90.0)	0.536 (0.059–4.341)	0.733 (0.038–14.315)	
Frequency of pregnancies	1	4 (20.0)	16 (80.0)	1	1	
	2	9 (18.8)	39 (81.3)	0.923 (0.248–3.434)	3.787 (0.630–22.756)	
	3	5 (7.6)	61 (92.4)	0.328 (0.079–1.364)	6.941 (1.511–31.890) *	0.013
	>3	3 (4.5)	63 (95.5)	0.190 (0.039–0.938) *	1.528 (0.309–7.564)	
Number of antenatal care visits	1	11 (22.0)	39 (78.0)	1	1	
	2	6 (7.7)	72 (92.3)	0.295 (0.102–0.860) *	0.242 (0.069–0.852) *	0.027
	3	4 (7.8)	47 (92.2)	0.302 (0.089–1.023)	0.282 (0.069–1.155)	
	>3	0 (0.0)	21 (100)	0.00 (0.00–0.00)	0.000 (0.00–0.00)	

Note: *P<0.05.

The counseling and health education provided by health care providers might, encourage women to take the supplement as prescribed, and educate them on the health benefit of taking iron folate supplement. ANC is a crucial channel for supplementing iron folate during pregnancy. Therefore, the observed relationship between the level of ANC service and the level of iron folate utilization is expected. Unlike to the WHO recommendation, at least four ANC follow up,[1] in the current study, pregnant women who had three and above three ANC follow up were not adherent to their iron folate supplement which was supported by two studies that number of ANC visits had no role to maternal welfare in women who had no maternal complications.[16,21] In addition to that, pregnant women with complications will fear side effects and they might not take the supplement as prescribed.

In the current study, another factor that was independently associated with adherence was providing health education and counseling on the importance of iron folate supplement, participants who had health information and counseling were around five times adherent to iron-folate supplement which was supported by many studies.[2,5,12,22–24] On the other hand, pregnant women who had three frequent pregnancies were almost seven times adherent to their iron folate supplement compared to women who had pregnancy for the first time. This finding was in line with a study done in eight rural districts of Ethiopia.[15] This could be due to health talks and advice about the benefit of iron folate supplement, antenatal visit and risks of anemia they know from past pregnancies.

From this study, the age of the pregnant women and their knowledge about the benefits of iron folate were not risk factors for the adherence level. This might due to different studies be used different age classifications and in the current study inappropriate distribution of participants based on their age,

Similarly, more than 95% of the participants know about the benefits of taking iron-folate. This implies that it is less likely knowledge might be a risk factor for adherence.

Conclusion

In Ayder Comprehensive Specialized Hospital, the right time to start iron folate in the first trimester was low and the adherence level was very poor which may have been attributed to a number of antenatal care visits, frequency of pregnancy and healthcare education and counseling about iron folate supplement. The government and other stakeholders should continue promoting the advantage of timely starting iron folate supplement, improve the quality of counseling in ANC service delivery and creating awareness about anemia during pregnancy, increasing access to iron folate and involving family members.

Limitation of the study

The possible limitations of this study include (1) golden standard method of measuring the amount of iron folate uptake like electronic and pill count method was not used, as they are expensive and not available, (2) a three months duration of data collection might be short to include more sample.

Ethical approval and consent to participate

The institutional review board of School of Pharmacy, College of Health Sciences, Mekelle University approved this study and the verbal informed consent process. Verbal informed consent was obtained from each participant. Confidentiality and privacy were maintained by using code during data collection. A letter of permission was also obtained from the chief clinical director of the Ayder Comprehensive Specialized Hospital. All the study participants were informed about the purpose of the study.

Abbreviation list

ACSH, Ayder Comprehensive Specialized Hospital; ANC, antenatal care; AOR, adjusted odds ratio; COR, crude odds ratio; WHO, World Health Organization; CI, confidence of interval.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Author contributions

All authors contributed to data analysis, drafting or revising the article, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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