

**ADHERENCE TO IRON AND FOLATE THERAPY AMONG PREGNANT WOMEN
ATTENDING ANTENATAL CLINIC AT A TERTIARY HOSPITAL IN SOUTHERN
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ABSTRACT

Background: Anaemia is highly prevalent among pregnant women especially in the developing countries. Iron deficiency is the most important cause. Adherence to haematinics may be an important challenging factor in combating anaemia. **Objective:** To determine the rate of adherence to haematinics and the prevalence of anaemia among pregnant women in the Antenatal clinic in the hospital. **Methodology:** This study included 200 pregnant women by systematic random sampling method. They were given standard dose of iron and folic supplements and followed up for a minimum period of 3 months. Then they were assessed for medication adherence and the presence of anaemia. Data were collected on the women socio-demographic, medical and obstetric profile, adherence rate, and associated factors influencing drug compliance. Missing more than 2 doses in One month was considered non-adherence. Anaemia was defined as PCV less than 33% (WHO). **Results:** The mean age of the women was 28.37±3.974 years. Awareness on iron therapy in pregnancy was 92% while adherence rate was 85%. Younger maternal age and advance gestational age were significantly associated with adherence (P=0.001). Educational level, family size and income did not significantly influence adherence (P>0.05). The prevalence of anaemia was 31%. Poor adherence and poor nutrition did not necessarily predict maternal anaemia (P=0.246, and p=0.430 respectively). Logistic regression of independent determinants of adherence shows that parity (OR: 41.0, 95% CI: 2.15-7.82) and antenatal counseling on haematinics (OR: 6.3, 95% CI: 1.57 – 25.20) were independent predictors of adherence. **Conclusion:** Educating pregnant clients on need for adherence to iron and folic acid supplement may promote healthy pregnancy.

KEYWORDS: Adherence, iron, anaemia, nutrition, awareness, haematinics.**INTRODUCTION**

Anaemia in pregnancy is one of the most common medical problems encountered by women in the third world countries and may affect up to one fifth of the world population.^[1,2] Iron deficiency is common in pregnancy due to haematological changes in pregnancy and additional iron needed for the development of the foetus.^[2,3] According to WHO the prevalence of anaemia in pregnancy may be as high as 50% in developing countries.^[1,4]

The pre-pregnant iron store of many women may not be adequate to sustain the pregnancy in many individuals due to this increased demand. The daily normal requirement for a gravid woman is about 20mg of iron in the second half of the pregnancy.^[5,6] The dietary composition in many communities may rarely contain up to 15mg of iron and this may not provide the needed amount of iron to the pregnant women.^[5] Also, of the

total amount of iron in food, only a fraction (about 10%) is available for absorption.^[4]

Therefore, haematinic supplements remains the most suitable mass intervention to prevent anaemia in pregnancy to increase the haemoglobin concentration to prevent anaemia in pregnancy. World Health Organization recommended this policy especially in the developing countries. But the effectiveness and success of such intervention may depend on several factors including patient adherence to medication.

Adherence is defined as the extent to which a patient correctly follows prescribed medication.^[5] Previous studies have suggested that non-adherence with medication is a common problem in pregnant women indicating that may have potentially negative consequences because treatment target may not be achieved in a particular disease condition.^[6-8]

There are several factors including health system and patient factors which determine the level of adherence to medication, which are not yet extensively studied hence this work.

MATERIALS AND METHODS

Study area and study site

The research was conducted at the University of Calabar Teaching Hospital Antenatal Clinic. The hospital is one of the two public tertiary health facilities in Calabar Metropolis, the capital of Cross River State which is located in South -South Zone of Nigeria. The study population comprised all consenting pregnant women, aged 18 – 49 years receiving antenatal care at the university of Calabar teaching hospital who met the inclusion criteria during the period of research.

Study Design

This was a cross sectional survey. The participants were assessed for eligibility using the inclusion and exclusion criteria below.

Women were recruited in their second trimester. Each woman was given a 3 - month course of iron and folic acid therapy. Other routine medications like malaria prophylaxis were administered according to national protocols. In their scheduled antenatal visit, they were assessed for the level of adherence with the iron and folic acid therapy, missing more than 2 pills consecutively in a month was considered non adherent.^[5] The packed cells volumes were determined.

Sample Size Determination

In a recent study 90% adherence rate was reported (adherence rate of 90%) the sample size was thus calculated using Leslie Kish formula and approximated to 200 to cater for attrition or 'drop outs'.

Sampling Technique

Systemic random sampling was used to select participants, the first respondent was chosen by simple balloting from folded papers labeled 1 to 3, there after every 3rd of the women enrolled at the registration point. The sample interval, 3, was chosen by dividing the estimated number of antenatal attendant during the 3 month study period (612) by the sample size (200). The estimated number of attendants per month was determined by dividing the total number of antenatal registration in the previous year by 12 using the ANC record register.

Pretesting of research tools

The questionnaire was pre-tested on ten pregnant women in General Hospital Calabar. This was to help modify the questionnaire to test for its reliability and validity. This also offers opportunity for the research assistants to be educated on proper filling of questionnaires.

Research protocols

Their baseline haemoglobin levels were noted before recruitment into the study. Women with moderate to severe anaemia were excluded because this category of women may require intensive therapeutic doses of iron and folic acid for the treatment of moderate to severe anemia instead of the routine prophylaxis. Some may require parenteral iron or blood transition for prompt treatment. Every eligible woman who made the criteria was given a three month course of iron (elemental iron of 60mg) and folic acid (400ug) to be taken daily. The drug was dispensed free at the ANC, they were then followed up.

The schedule clinic appointment of all the participants was noted and a number tag on each folder was used to trace the women. They were reassessed in three month time for adherence and haemoglobin level. The recruitment was done in women with gestational ages of 16 – 28 weeks. This is the period of rapid fetal growth, increase red cell mass and placental size-thus increased demand on maternal iron store. If iron supplement is not routinely administered during this period most women especially in the tropics would become anaemic due to excessive demand for iron.

Two methods are widely used to assess drug adherence: pill count adherence and self reporting adherence.^[9,10] In this study, self reporting was used since we do not routinely instruct patients during ANC to keep the empty drug packs and bring them to next clinic attendance with the remaining pills.

Exclusion criteria

Women were excluded from the study if they decline to give consent, women in their 1st trimester, or if they have any of the following disorders: haemoglobinopathy, haemolytic anaemia, episode of vaginal bleeding in index pregnancy, chronic inflammatory diseases or mal-absorption syndrome or allergy to iron therapy.

Data Collection

The data were collected using a semi-structured questionnaire, which included demographic information, medical and obstetric history, drug history, questions on awareness and usage of haematinics. Then their latest packed cell volume (PCV) levels determined and recorded.

Missing 2 or more pills in a month was considered as non-compliance.^[5] Haemoglobin level (anaemia) was classified according to the WHO recommendations.

Data Management

Questionnaire were manually sorted out, serially numbered and coded before entry in Microsoft Excel. This was thereafter imported into Statistical Software for Social Sciences (SPSS) version 20.0 for analysis. Data analysis was done using descriptive statistics (Frequency, proportions, means and standard deviation) to summarize

variables. Inferential statistics (chi square, to test the significance of association between two categorical variables) was used to test for significance at 5% level of significance. Variables that were significant at bivariate analysis were further subjected to multiple logistic regression analysis to identify true determinants of adherence to haematinics and exclude confounding variables. Determinants were also at 5% level of significance.

RESULTS

Table 1 shows the socio-demographic characteristics of the study participants. Their mean age was 28.37 ± 3.974 years. Women in the 26-30 years age group constituted about half of the participants (51%). Majority of them were Christians (98%) and almost all reside in urban area (98%) and also married (99%).

Table 1: Socio-demographic characteristics of pregnant women.

Variable	Frequency (N=200)	Percentage (%)
Age group/years		Age group/years
≤20	2	1.0
21-25	46	23.0
26-30	102	51.0
31-35	43	21.5
>35	7	3.5
Mean age :	28.37±3.974	
Religion		
Christianity	98.0	98.0
Islam	3	1.5
Traditional	1	0.5
Area of residence		
Urban	189	94.5
Rural	11	5.5
Marital status		
Married	198	99.0
Single	2	1.0
Separated/divorced	0	0.0
Gestational age/weeks		
≤20	8	4.0
21-26	102	51.0
>26	90	45.0

About half (51%) have family size greater than 5. Over two-third (89%) attained at least secondary education while about half (50.5%) belong to at most middle income group.

Table 2 Shows haematinics medication-related characteristics of study participants. More than two-third of the study participants 184 (92%) knew about haematinics as a blood building medication while a slightly lower proportion take haematinics routinely prior to recruitment. They were asked to state their source of information and about 60% of them learnt about haematinics through antenatal classes.

Table 2: Haematinics/other medication-related characteristics of study participants.

Variable	Frequency (N=200)	Percentage (%)
Knows about haematinics?		
Yes	184	92.0
No	16	8.0
Haematinic adherence?		
Yes	170	85.0
No	30	15.0
Benefits from haematinics?		
Yes	170	85.0
No	30	15.0
Comfortable with cost of haematinics?		
Yes	170	85.0
No	30	15.0
Get tired taking haematinics?		
Yes	43	21.5
No	157	78.5
Taking other medication?		
Yes	47	23.5
No	153	76.5

Table 3 Shows the relationship between socio-demographic characteristics and adherence to iron therapy among the study participants. There was statistically significant relationship between age group ($p < 0.001$) and gestational age ($p = 0.005$) and adherent to haematinics among study participants. Respondents who were in their third trimester and those aged 20 years and

below were significantly more likely to be adherent to haematinics. Although there was no significant relationship between marital status and adherent to haematinics, those who were married were more likely to be adherent. There was no significant relationship between area of residence and adherence to haematinics ($p = 0.217$).

Table 3: Relationship between socio-demographic characteristics and adherence to haematinics among study participants.

Variable	Adherent to haematinics			Chi square	p value
	Yes	No	Total		
Age group/years					
≤20	2(100.0)	0(0.0)	2(100.0)	FET	<0.001*
21-25	32(69.6)	14(30.4)	46(100.0)		
26-30	89(87.3)	13(12.7)	102(100.0)		
31-35	42(97.7)	1(2.3)	43(100.0)		
>35	5(71.4)	2(28.6)	7(100.0)		
Religion					
Christianity	168(85.6)	28(14.4)	195(100.0)	FET	0.180
Islam	2(66.7)	1(33.3)	3(100.0)		
Traditional	0(0.0)	1(100.0)	1(100.0)		
Area of residence					
Urban	162(85.7)	27(14.3)	189(100.0)	FET	0.217
Rural	8(72.7)	3(27.3)	11(100.0)		
Marital status					
Married	169(85.4)	29(14.6)	198(100.0)	FET	0.278
Single	1(50.0)	1(50.0)	2(100.0)		
Separated/divorced	0(0.0)	0(0.0)	0(0.0)		
Gestational age/weeks					
≤13	4(50.0)	4(50.0)	8(100.0)	FET	0.005*
14-26	84(82.4)	18(17.6)	102(100.0)		
≥27	82(91.1)	8(8.9)	90(100.0)		

*Statistically significant.

Table 4 Shows the relationship between Family/socio-economic characteristics and adherence to haematinics among study participants. There was statistically significant relationship between number of children

($p = 0.004$), primigravidity ($p = 0.048$), and adherent to haematinics among study respondents. There was no significant relationship between adherence and family

size (p=0.143), highest level of education (p=0.365) and average monthly income (p=0.530).

Table 4: Relationship between Family/socio-economic characteristics and adherence to haematinics among study participants.

Variable	Adherent to haematinics?			Chi square	p value
	Yes	No	Total		
Number of children					
Nil	74(78.7)	20(21.3)	94(100.0)	6.264	0.004*
1-3	50(87.7)	7(12.3)	57(100.0)		
>3	46(93.9)	3(6.1)	49(100.0)		
Family size					
1-5	67(88.8)	11(11.2)	98(100.0)	2.148	0.143)
>5	83(81.4)	19(18.6)	102(100.0)		
Index pregnancy is first?					
Yes	76(84.4)	14(15.6)	90(100.0)	0.040	0.048*
No	94(85.5)	16(14.5)	110(100.0)		
Highest level of education					
None	3(75.0)	1(25.0)	4(100.0)	FET	0.365
Primary	15(83.3)	3(16.7)	18(100.0)		
Secondary	63(80.8)	15(19.2)	78(100.0)		
Tertiary	89(89.0)	11(11.0)	100(100.0)		
Average monthly income/naira					
<18500	9(75.0)	3(25.0)	12(100.0)	FET	0.530
18500-85000	75(84.3)	14(15.7)	89(100.0)		
>85000	86(86.9)	13(13.1)	99(100.0)		

*Statistically significant.

The prevalence of anaemia among the study participants was 31.0%.

The relationship between adherence with iron therapy, maternal nutrition and PCV of respondents were assessed. Respondents who were non-compliant with haematinics were more likely to have anaemia compared with those who were compliant with haematinics. However, the difference was not statistically significant (0.246). Respondents who were on balanced diet and balanced diet plus snacks were more likely to have normal PCV compared with those who were on poor and fairly good nutrition. However, the difference was not statistically significant (0.430).

Table 5 shows relationship between ANC-related activity/drug outcome and adherence to haematinics among study participants. There was significant relationship between adherence and haematinic counseling. Participants who received counseling on haematinics were significantly more likely to be adherent (p<0.001). Those who were comfortable with the brand of haematinics were also significantly more likely to be adherent (p<0.001). There was no significant relationship between adherence and experience of side effects (p=1.000).

Table 5: Relationship between ANC-related activity/drug outcome and adherence to haematinics among study participants.

Variable	Adherence to haematinics			Chi square	p value
	Yes	No	Total		
Number of ANC missed					
None	129(83.8)	25(16.2)	154(100.0)	FET	0.635
1	22(84.6)	4(15.4)	26(100.0)		
2	12(100.0)	0(0.0)	12(100.0)		
>2	7(87.5)	1(12.5)	8(100.0)		
Counseled on haematinics?					
Yes	142(94.7)	8(5.3)	150(100.0)	43.974	<0.001*
No	28(56.0)	22(44.0)	50(100.0)		
Comfortable with haematinic?					
Yes	163(95.9)	7(4.1)	170(100.0)	FET	<0.001*
No	7(23.3)	23(76.7)	30(100.0)		
Experienced side effects?					
Yes	13(86.7)	2(13.3)	15(100.0)	FET	1.000
No	157(84.9)	28(15.1)	185(100.0)		

Logistic regression was used to assess the independent determinants of adherence to haematinic among study participants. Table 8 shows that number of children (Odds ratio: 41.0, 95% Confidence interval: 2.151-782.8), comfortable with haematinics (Odds ratio: 267.5, 95% Confidence interval: 24.1-29.70) and counseling on haematinics (Odds ratio: 6.3, 95% Confidence interval: 1.575-25.500) were independent determinants of adherence to haematinics. Participants who had at most 3 children ($p=0.014$), were comfortable with haematinics ($p<0.001$) and who were counseled on haematinics ($p=0.009$) were statistically significantly more likely to be adherent to haematinics. However, age group ($p=0.999$), first pregnancy ($p=0.439$) and gestational age ($p=0.707$) of study participants were not independent

determinants of adherent to haematinics among study participants.

Table 6: Logistic regression of independent determinants of adherence to haematinic among study participants.

Variable	Odds Ratio	95% Confidence Interval	p-value
Age group/years			
<35	0.0	0.00-1.000	0.999
≥ 35	1		
First pregnancy?			
Yes	2.0	0.328-13.028	0.439
No	1		
Gestational age/weeks			
≤ 26	0.5	0.19-14.502	0.707
> 26	1		
Number of children			
≤ 3	41.0	2.151-782.8	0.014*
> 3	1		
Comfortable with haematinics?			
Yes	2.67.5	24.1-29.70	$<0.001^*$
No	1		
Counselled on haematinics?			
Yes	6.32	1.575-25.500	0.009*
No	1		

*=Statistically significant.

DISCUSSION

As much as possible this study attempted to consider the ideal situation as being practiced in the setting of a tertiary institution regarding iron /folic therapy in pregnancy hence, the 'self reporting' method adopted in determining adherence rate. Previous studies did not show any significant difference between adherence rate by pill count method and adherence by self reporting.^[9,10]

The mean age of 28.37 ± 3.974 years among the pregnant women studied was similar to findings from other studies.^[11,12] Awareness concerning iron and folic acid therapy in pregnancy among the respondents was 92%. This was in keeping with the finding in another African country (96.6%).^[12] This high level of awareness suggests the benefit of antenatal education offered to pregnant women in the hospital. This is also evidenced in the findings that more than 60% of the respondents mentioned ANC education as the main source of information on haematinics. Awareness is an important factor that modifies health seeking behaviour positively.

There is remarkable improvement in female education in this locality as about half of the participants have had tertiary education and two third have had at least secondary level of education compared to the situation in another African country where only one percent of the pregnant women studied acquired tertiary education.^[12] The implication is that educated women have better knowledge about iron deficiency anaemia and therapy, better appreciate the benefits of supplements in pregnancy.

The 85% adherence rate to iron supplement among the women in this study was high compared to 64.7% and 74.9% reported in previous studies.^[11,13] A much lower rate of 20.4% was also reported in one study.^[14] However, it was slightly lower than 90 to 92.3% reported by Asian study.^[15] The reason for this high compliance may be enhanced by provision of iron and folic acid supplement free especially in government owned facilities in the country. In this study the most commonly cited reasons for non adherence were forgetfulness, fear

of running out of medications due to uncertainty of medication supply, fear of harmful effect of drug to the fetus and medication side effects. Similar findings were previously reported.^[14]

In assessing the influence of demographic profile on adherence, the study shows that the level of education, family size and family income did not significantly influence awareness and adherence to haematinics medication whereas younger maternal age and advanced gestational age were positively correlated with adherence significantly. This is in sharp contradiction to a previous study^[14] where older women (age 35 - 49years) were more likely to be compliant to iron therapy than the younger women (age 15-24years). The reason was that older women in that study were more likely to receive support from family members, have better experience in preventive health and have more concern about their health.

The socio economic profile of the women did not significantly predict adherence in this study. This is in contrast to a previous study conducted among low income group of women in USA in 2005 on pill count adherence to prenatal multivitamin use, where it was reported that ethnicity, multigravidity, smoking, educational and marital status, significantly affected compliance with prescribed medication.^[16] Furthermore, in another study in Vietnam, literate women reported high compliance when compared with women who were not literate.^[17]

The 31.1% prevalence of anaemia among the study participants was much lower than the WHO estimated prevalence of 56% in developing country.^[5] The relatively low prevalence may be due to increased awareness and high rate of adherence to iron supplements as well as effective counseling on nutrition, hygiene and preventive strategies against malaria in pregnancy.

There was no significant difference in incidence of anaemia among the haematinics adherent and non adherent groups of women in this study. The low compliance women may have utilized more of other cheap sources of protein and iron in their diet especially during pregnancy. Previous study had shown that educating the pregnant women on health issues by doctors is positively associated with increased adherence to iron medication.^[18]

CONCLUSION

Education and nutritional counseling in pregnancy may improve medication adherence. ANC and other health service providers may need to pay more attention to medication adherence and iron supplement should be dispensed at ANC possibly free.

Limitation of study

This study relies in part on information given by patients, therefore, some vital issues might not have been volunteered.

Measurement of serum ferritin levels would have given a better diagnosis of the iron status in the pregnant women. This was not done due to the cost and logistics.

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