ORIGINAL ARTICLE

Determinants of compliance to iron supplementation among pregnant women in Enugu, Southeastern Nigeria

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Abstract

Background: Anemia in pregnancy is highly prevalent among antenatal clinic attendees in Enugu, Nigeria despite the practice of routine iron supplementation in pregnancy. The major problem with iron supplementation in pregnancy is compliance, and this may be a potential driver to the persistent high prevalence of anemia in this population.

Objectives: To find out the compliance rate and determinants of compliance to iron supplementation among pregnant women in Enugu, southeastern Nigeria.

Materials and Methods: This was a questionnaire-based cross-sectional study of eligible pregnant women receiving antenatal care at the University of Nigeria Teaching Hospital (UNTH), Ituku/Ozalla, Enugu, Nigeria between April 1, 2012 and January 31, 2013.

Results: The knowledge of iron supplementation was 76.3% (n = 302), however, the compliance rate was 65.9% (n = 261). Tertiary level of education and high social class were factors significantly associated with compliance to iron supplementation after adjusting for other factors in the binary logistic regression analysis ($P < 0.05$). The major barriers to compliance to iron supplementation included gastrointestinal side effects of iron supplements (41.7%), non-affordability of iron supplements (28.3%), and forgetfulness (15.0%) among the antenatal mothers.

Conclusion: The compliance rate of 65.9% for iron supplementation by pregnant mothers in Enugu can further be improved by providing the drug free of charge in the short term and improvement in education and socioeconomic class of the populace in the long run.

Key words: Compliance, determinants, Enugu, iron supplementation, pregnancy

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Introduction

Anemia in pregnancy is a major health problem in many developing countries where nutritional deficiency, malaria, and other parasitic infections contribute to increased maternal and perinatal mortality and morbidity.[1] Iron deficiency is the most common nutritional disorder in the world and pregnant women are especially at risk.[1] The prevalence of anemia in pregnancy has remained unacceptably high worldwide despite the fact that routine iron supplementation during pregnancy has been almost universally recommended to prevent maternal anemia especially in developing countries over the past three decades.[2] No doubt, iron deficiency anemia is the most common cause of anemia in pregnancy and is responsible for 95% of anemia during pregnancy reflecting the increased demands for iron in pregnancy.[1] Iron deficiency anemia during pregnancy increases the risk of maternal mortality, fetal morbidity and mortality, preterm delivery, and low birth weight.[3] In children, it may lead to slow growth and

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development, frequent infections, and some behavioral problems.[3]

Iron supplementation increases hemoglobin and feritin levels during pregnancy and also improves maternal iron stores in the puerperium.[4] In view of this fact, iron supplementation in pregnancy is currently the most common strategy for the control of iron deficiency anemia during pregnancy especially in developing countries where traditional diets provide inadequate iron and where malaria and other infections causing increased losses are endemic.[1,5] However, the major problem with iron supplementation in pregnancy is compliance, as women often fail to take the supplements regularly as prescribed by their physicians due to varying factors.[6,7] Measuring the compliance to iron supplementation is therefore important, as iron supplementation is most effective when taken regularly for relatively prolonged periods, and pill taking may be discontinued long before the regimen could have a positive impact.[4]

Previous reports from Nigeria on iron supplementation in pregnancy appeared to have regional variations in terms of compliance rate and determinants of compliance to iron supplementation,[6,8] implying that each region may have peculiar factors affecting compliance to iron supplementation. There is no study to the best of authors' knowledge from southeastern region of the country in this perspective. Understanding these factors no doubt will be useful in counseling and designing strategies/policies aimed at improving compliance to iron supplementation in the region and ultimately reducing the burden of iron deficiency anemia in the country.

In Enugu, Nigeria, the prevalence of anemia in pregnancy among antenatal clinic attendees is persistently high[9-12] and iron deficiency anemia has been consistently implicated despite the practice of routine iron supplementation in pregnancy. These previous reports were hospital-based studies from tertiary health institutions in Enugu and reported high prevalence rates ranging from 40.4-65.7%.[9-12] The major problem with iron supplementation in pregnancy is compliance[4,6,7] and this is thought to be a potential driver to the persistent high prevalence of anemia in this population. This study therefore aimed to find out the compliance and determinants of compliance to iron supplementation among antenatal clinic attendees in Enugu, southeastern Nigeria.

Materials and Methods

Study area

Enugu State is one of the five states in the southeast geopolitical zone of Nigeria, and its capital city is Enugu. It lies within the west African rainforest region (latitude: 5°55' and 7°10' N and longitude: 6°50' and 7°55' E), through a land area of approximately 8727.1 km^2. It has an average annual temperature of between 23.1 and 31°C with a rainfall of 1520–2030 mm. It has a mixed rural and urban population with the majority being Igbo with a population of about 464,514 inhabitants of which 52% are female.

Study setting

The study was carried out at the UNTH, Ituku-Ozalla, Enugu. The UNTH, Enugu is a tertiary hospital owned by the federal government of Nigeria. It is currently located in Ituku-Ozalla, at the outskirts of Enugu city. The hospital offers antenatal and postnatal care services to pregnant women in Enugu state and practices the traditional model of antenatal care whereby women are generally seen monthly until 28 weeks of gestation, fortnightly until 36 weeks, and then weekly until delivery. Further details of the study area/center are described in a recent study.[12]

Study design and sample selection

The study was a questionnaire-based cross-sectional survey of consecutive clients attending the antenatal clinic of the hospital between 1st April 2012 and 31st January 2013. Consenting women assessing routine antenatal care at the hospital and who have strictly attended antenatal care for ≥4 months preceding the study and had received prescriptions for iron supplementation were included in the study. Using a compliance rate of 37.5% obtained in a previous study from Oyo state, southwestern Nigeria[8] at a confidence level of 95% and error margin of 5%, the calculated minimum sample size was 360. However, a sample of 420 was used for the study.

Following individual counseling of eligible participants, structured and pretested questionnaires were administered to the consenting women by trained medical interns. Ethical clearance for the study was obtained from the institutional review board of UNTH, Enugu. Data sought included the sociodemographic characteristics of the respondents and the knowledge and compliance to iron supplementation in pregnancy. The sociodemographic data included the age, marital status, parity, educational level, occupation of the husband, duration of pregnancy at the time of interview, and the gestational age at first antenatal visit.

The hospital protocol recommends routine iron supplementation in pregnancy using once daily oral preparations that contains 60 mg of elemental iron per tablet. This prescription is in accordance with World Health Organization (WHO) guidelines for iron supplementation in pregnancy.[1,4] Participants were not queried regarding identification of iron formulation, as the primary preparation currently dispensed in the hospital contains 60 mg of elemental iron and 350 μg of folic acid per tablet.

Definition of compliance to iron supplementation was adapted from the study from Riyadh, Saudi

Arabia.[4] Thus, assessment of compliance depended on the participants' questionnaire responses about their use of iron supplementation during the preceding 4 months of pregnancy. Supplementation compliance was divided into one of three categories: (1) strictly compliant, (2) partially complaint, and (3) non-compliant. Participants who reported regular use (once daily) for the preceding 4 months of pregnancy and not missing any dose per week were considered as strictly complying with iron supplementation guidelines. Participants who followed iron supplementation guidelines regularly but for <4 months or irregularly for 4 months were considered as partially compliant. Participants who admitted to using iron supplementation for <1 month or who had not used iron supplementation at any time during the preceding 4 months of pregnancy were considered non-compliant. Categories 1 and 2 were also further combined together as 'some compliance' group.[4]

The assessment of knowledge of iron supplementation in pregnancy was based on the participants' responses to a set of four questions including: (1) awareness of iron supplementation in pregnancy, (2) reasons for iron supplementation, (3) possible side effects of oral iron preparations on the mother, and (4) possible effects of iron deficiency on pregnancy. Participants who answered correctly to three or four of the above questions were considered to have good knowledge of iron supplementation in pregnancy, whereas those who answered correctly to two or less were said to have poor knowledge.

As described in a previous study,[13] social class of respondents was defined using a scoring system based on the educational level of the woman and her husband's occupation or that of the caregiver (for unmarried women). Thus, high social class was defined as belonging to class I or II, whereas low social class was defined as belonging to class III, IV, or V.

Data analysis was both descriptive and inferential at 95% confidence level using the Statistical Package for Social Sciences (SPSS) software version 16 [SPSS inc. Chicago, Illinois]. Proportions were compared by logistic regression analysis and relationships expressed using odd ratio and confidence intervals. A *P* value of less than 0.05 was considered statistically significant.

Results

In all, 420 questionnaires were administered but 396 were correctly filled, giving a response rate of 94.3%. The mean age of the respondents and the mean gestational age of their pregnancies were 32.7 ± 3.4 (range: 17-54) years and 35.3 ± 5.7 (range: 29-41) weeks, respectively. Most (67.4%, 267/396) of the respondents were between 21 and 30 years of age and 97.7% (387/396) of them were married. Majority (68.2%, 270/396) of the women had tertiary level of education, were multiparous (61.4%, 243/396), and belonged to social class II (52.3%, 207/396). Details of the sociodemographic characteristics of the respondents were as shown in Table 1.

The majority (76.3%, $n = 302$) of the respondents had good knowledge of iron supplementation in pregnancy, whereas 94 (23.7%) had poor knowledge. A total of 65.09% (261/396) of the respondents reported using iron supplements strictly during the last 4 months preceding the study (Category 1). There were 75 (18.9%) partial compliers (Category 2), whereas 60 (15.2%) respondents reported non-use of iron supplement (Category 3). Accordingly, combined Categories 1 and 2 comprised 336 (84.8%) respondents. When the strictly and partially compliant categories (some compliance) were joined together as one group and compared with the non-compliant group to assess for the factors associated with non-compliance to iron supplementation, it was observed that tertiary level of education and high social class were factors significantly associated with compliance to iron supplementation in the binary logistic regression analysis ($P < 0.05$). Details are shown in Table 2. Furthermore, women with good knowledge of iron supplementation in pregnancy were significantly more likely to comply with iron supplementation than those with poor knowledge [75.2% (227/302) vs 33% (31/94); odd ratio (OR): 6.15; 95% confidence interval (CI): 3.72-10.17; $P < 0.001$].

The reasons for non-compliance given by the 60 respondents included gastrointestinal side effects of iron supplements (41.7%, 25/60), non-affordability of iron supplements (28.3%, 17/60), forgetfulness (15.0%, 9/60), and belief that they have adequate diet and do not need any iron supplements (10%, 6/60). Three respondents (5%)

Table 1: Respondents' sociodemographic characteristics

Sociodemographic variable	Variable subgroup	Frequency	Percentage
Age groups (years)	≤20	14	3.5
	21-30	267	67.4
	31-40	104	26.3
	41-50	11	2.8
Parity	Nullipara	153	38.6
	Multipara	243	61.4
Marital status	Single	9	2.3
	Married	387	97.7
Educational status	Primary	21	5.3
	Secondary	105	26.5
	Tertiary	270	68.2
Social class	I	51	12.9
	II	207	52.3
	III	92	23.2
	IV	40	10.1
	V	6	1.5

had no reason for non-compliance to iron supplementation. The commonest gastrointestinal side effects reported by the respondents were heartburn (96%, 24/25) and nausea (84%, 21/25). Other gastrointestinal side effects reported were as shown in Table 3.

Discussion

This study has demonstrated that 65.9% of pregnant Nigerian women assessing antenatal care in UNTH, Enugu comply 'strictly' to iron supplementation in pregnancy and that 84.8% show 'some compliance' to iron supplementation in pregnancy. These figures are similar to 87% 'overall compliance' rate reported from Port Harcourt, Nigeria in 2011,[6] and 88% reported from northwest Iran in 2008,[14] and 69% 'strict compliance' rate reported from Senegal in 2007.[15] They are, however, higher than compliance rate of 37.5% reported from Oyo state, Nigeria in 2006[8] and most other figures reported from developing countries.[4,16-18]

The high compliance rate obtained in this report may be related to the sociodemographic characteristics of the study population, a majority having tertiary education and belonging to high social class. These peculiar characteristics of the respondents is difficult to explain, however, may be related to the current location of the hospital at the outskirts of Enugu city. Thus, it is possible that the more educated and invariably higher social class are more likely to see the need for specialist care during pregnancy and hence seek for such services in a distant hospital like UNTH, Ituku/Ozalla, Enugu.

It was observed in this report that women with good knowledge of iron supplementation in pregnancy were six times more likely to comply with iron supplementation than those with poor knowledge [75.2% vs 33%; OR: 6.15; 95% CI: 3.72-10.17; $P < 0.001$]. It may therefore imply that educating the women on significance of iron supplementation in pregnancy may improve their compliance to iron supplementation in pregnancy. This is important because as many as 94 women (23.7%) could not show good knowledge of iron supplementation in pregnancy. The role of health care providers in improving compliance to iron supplementation vis-à-vis provision of adequate information in this regard has been documented by previous authors.[15] There is thus need for improvement in the quality of health talks given to the antenatal mothers in the hospital.

Furthermore, tertiary education was identified in this report as a strong determinant of compliance to iron supplementation in pregnancy. This may be explained by the expected impact of education on uptake of maternal and neonatal health services as observed by previous authors.[12]

Table 2: Respondents' characteristics versus compliance to iron supplementation in pregnancy, in the binary logistic regression analysis

Compliance to iron supplementation	Yes (%)	No (%)	OR (95% CI)	*P* value
Age (years)				
≤35	156 (45.5)	187 (54.5)	0.88 (0.51-1.53)	0.66
>35	25 (47.2)	28 (52.8)		
Parity				
Nullipara	72 (47.1)	81 (52.9)	0.84 (0.58-1.22)	0.28
Multipara	123 (50.6)	120 (49.4)		
Educational status				
Prim./sec.	37 (29.4)	89 (70.6)	5.53 (3.14-9.76)	<0.001
Tertiary	157 (58.1)	113 (41.9)		
Social class				
High	147 (57.0)	111 (43.0)	2.93 (1.83-4.69)	<0.001
Low	55 (39.9)	83 (60.1)		

Prim./sec.=Primary/secondary, OR=Odd ratio, CI=Confidence interval

Table 3: Gastrointestinal side effects of iron supplements reported by the respondents

Gastrointestinal side effects	Number (*n*=25)	Percentage
Heartburn	24	96
Nausea	21	84
Stomach cramps	18	72
Constipation	13	52
Diarrhea	7	28
Vomiting	3	12

It is expected that the educated are more likely to appreciate the benefits of iron supplementation in pregnancy and hence more likely to comply with the prescriptions. It is obvious as described by Olusanya and coworkers[13] that the higher the educational status of the woman, the higher the social class, and this no doubt may explain the higher compliance rate among the women of higher social class than the women of lower social class.

Because the gastrointestinal side effects of iron supplements were observed as the major deterrent to compliance to iron supplementation in this population, it will be necessary to counsel the women that these side effects are generally transient and not harmful and where intolerable could be significantly ameliorated by taking the iron supplements with food. Dispensing the iron supplements free of charge to all the antenatal mothers will also definitely improve compliance to iron supplementation in the population as non-affordability of the drug was the barrier to compliance in up to 23.8% of the cases. This strategy was reported by Seck and Jackson to have significantly improved compliance to iron supplementation in Senegal in 2009.[19] Furthermore, because forgetfulness was the barrier to iron supplementation by some women, it is necessary that women are counseled during prenatal visits on possible strategies

that could help them remember to take their tablets; for example, placing the tablets in a spot that they see every day (e.g. breakfast or night table, kitchen counter, etc.) as suggested by previous authors.[4]

The limitation of this study includes the fact that the ingestion of the iron supplements and thus the calculation of compliance to iron supplementation was based on the women's history of reportage of ingestion of the prescribed iron supplement with likelihood of recall of events bias. Another important drawback is that this study is 'hospital based' and as such limits generalization to the entire population. Despite these limitations, the study has initiated the process of filling the gap on compliance to iron supplementation in pregnancy in southeastern Nigerian.

Conclusion/Recommendations

The strict compliance rate of 65.9% for iron supplementation by pregnant mothers in Enugu, southeastern Nigeria can further be improved by providing the drug free of charge in the short term and further improvement in education and socioeconomic class of the populace in the long run.

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