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Prevalence of Iron Deficiency Anaemia among Pregnant Women in Urban and Rural Areas of Abia State

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Abstract: This study aimed at identifying the prevalence of iron deficiency anaemia among pregnant women at different pregnancy trimesters in rural and urban areas of Abia state, Nigeria. Iron deficiency anaemia is recognized as the most prevalent nutritional problem in the world and has devastating consequences on the mother and foetus. The subjects that participated in this study were pregnant women (in their various trimesters) from an urban hospital precisely the Federal Medical Center, Umuahia and a rural hospital, General Hospital, Amachara, both in Abia State; who attended the hospitals antenatal clinics. Their ages ranged between 19-39 years. A total of four hundred pregnant women were used for haemoglobin assessment while two hundred women were used for serum ferritin assessment. The assessments were carried out using standard procedures. The haemoglobin and serum ferritin concentrations were categorized using recommended standards. About 25% of the women were in their first trimester, 38% were in second trimester while 37% were in their third trimester. The mean age of the pregnant women was 28.54±4.71 years with a minimum of 19 years. The result showed that the prevalence of anaemia was 32.3% while 14% of the women were iron deficient. The prevalence of Iron deficiency anaemia was 33.3 and 30.8% among the rural and urban pregnant women respectively and mostly in their third trimesters.

Key words: Iron deficiency, anaemia, pregnancy, trimesters

INTRODUCTION

Iron deficiency anaemia is recognized as the most prevalent nutritional problem in the world (Nelly *et al*., 2000). In pregnancy, iron requirements are increased especially in the last trimester when they may be several times higher than at other stages of the life cycle. The iron requirements of pregnancy are satisfied by the iron stores and the diet (Subcommittee on Nutritional Status and Weight gain during pregnancy, 1990). It has been known for many years that haemoglobin concentration falls during pregnancy, principally as a result of haemodilution, reaching a minimum at about 32 weeks of gestation. FAO/WHO/UNU Expert Consultation (1985) stated that it should not fall below 11.0 g/dl at any time during pregnancy. Low haemoglobin values, which may be associated with a poor outcome of pregnancy, can be remedied by iron supplementation, as the majority of cases of anaemia are due to iron deficiency associated with depleted body iron stores and inadequate iron intake.

Iron which is an essential needed nutrient especially during period of pregnancy is not gotten adequately because of dietary deficiency thus causing a wide spread ill health, inefficiency and unhappiness during pregnancy (Pyke, 1982). Despite the wide spread policies advocating iron supplementation during pregnancy, few effective prenatal iron supplementation programme have been identified (Nelly *et al*., 2000).

Despite the wide spread policies advocating iron supplementation during pregnancy, few effective prenatal iron supplementation programme have been identified (Nelly *et al*., 2000). This study will aim at locating persons and groups whose nutritional status ought to be improved (Fisher and Fungua, 1979).

MATERIALS AND METHODS

The subjects that participated in this study were pregnant women (in their various trimesters) from an urban hospital precisely the Federal Medical Center, Umuahia North Local Government Area and a rural hospital, General Hospital, Amachara, Umuahia South Local Government Area, both in Abia State; who attended the hospitals antenatal clinics. Their ages ranged between 19-39 years. A total of four hundred pregnant women were used for haemoglobin assessment while two hundred women were used for serum ferritin assessment.

Venous blood samples were collected by vein puncture method. The blood samples were used to determine the Haemoglobin and serum ferritin concentration of the pregnant women using standard procedures (National Committee for Clinical Laboratory Standards, 1991). The haemoglobin concentrations were categorized as recommended by WHO/UNICEF/UNU (2001): Not anaemic (>11.0 g/dl), Mild anaemia (10-10.9 g/dl), Moderate anaemia (7.0-9.9 g/dl), Severe anaemia

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(<7.0 g/dl) and All anaemia (<11.0 g/dl). The serum ferritin concentration (µg/l) was categorized as Iron deficiency (<12 µg/dl) and Normal iron (>12 µg/dl) as reported by Whitney and Rolfes (2008).

Statistical analysis: Descriptive statistics which included the mean, standard deviation, frequency and percentages were computed for the measurements and responses obtained. Analysis of Variance (ANOVA) and the t-test were used to compare the measurements obtained between the trimesters and locations, respectively. Means were separated using the Duncan Multiple Range Test. Chi-square analysis was used to test the level of association between prevalence, trimester and location. Significant differences were judged for all analysis at $p<0.05$. All statistical analyses were carried out using Statistical Package for Social Sciences (SPSS) for Windows Version 20.

RESULTS AND DISCUSSION

Characteristics of the pregnant women studied: A total of 400 pregnant women were used for the study. Equal numbers of the pregnant women (200) were from both the rural and urban locations. About 25% of the women were in their first trimester, 38% were in second trimester while 37% were in their third trimester. The mean age of the pregnant women was 28.54±4.71 years with a minimum of 19 years. This indicates that the women were of the child bearing age. Also the mean gestation period of the pregnancies was found to be 24.43±9.92 with a maximum of 37 weeks.

Biochemical characteristics of the pregnant women studied: The study showed that a total 32.3% of pregnant women were anaemic. The result in this study indicated that the prevalence of anaemia is of moderate public health significance when compared with WHO/UNICEF/UNU (2001) recommendations (20-39%). Anaemia reduces a woman's ability to survive bleeding during and after childbirth (Galloway, 2003). The result in this study further revealed that about 0.5% of the pregnant women studied with severe anaemia are particularly at risk and have a 3.5 times greater chance of dying from obstetric complications during or after pregnancy than women who do not have anaemia (67.8%). Furthermore, the high prevalence of anaemia in the third trimester is particularly worrisome as anaemia related fatigue also makes the effort of labour more difficult thus prolonging delivery.

A total of 14% of the pregnant women were iron deficient with a mean serum feritin of 18.75 µg/dl.

The result in Table 2 showed that among the rural women studied, pregnant women in the second trimester had significantly higher ($p<0.05$) mean haemoglobin (65.45) than the others while in the urban location there was no significant difference ($p>0.05$) between the mean haemoglobin of women in the first (69.06 g/dl) and second (65.56 g/dl) trimesters. However, in both locations, women in the third trimester had the lowest haemoglobin values (10.45 g/dl for rural and 10.64 g/dl for urban). It has been argued that low Hb concentrations at the end of the second trimester (invariably beginning of third semester) are normal and even desirable because they significantly appropriate plasma volume expansion (Allen, 2001). Obiakor *et al.* (2005) also reported a similar result of increased cases of anaemia among pregnant women in the 3rd trimester. This could be attributed to the maternal expanding tissues and increased foetal demand (INACG, 1989). Table 2 further showed that a total of 40% of the pregnant women in the rural areas had various forms of anaemia as against 24.5% in the urban areas. In the rural areas, 1.3% of the pregnant women in their second trimester had severe anaemia while 2.0% of the pregnant women in their first trimester in the urban areas had severe anaemia. The higher prevalence of anaemia among rural women compared to their urban counterparts corroborates the findings of Rusescu (2005) among rural and urban pregnant women in Romania.

Table 1: Haemoglobin and serum ferritin status of the pregnant women studied

	Frequency	Percentage
Haemoglobin (g/dl)		
Severely anaemic	2	0.5
Moderately anaemic	51	12.8
Mildly anaemic	76	19.0
Not anaemic	271	67.8
Mean±SD	38.74±29.36	
Serum ferritin (µg/dl)		
Iron deficient	28	14.0
Normal Iron stores	172	86.0
Mean±SD	18.75±8.97	

The mean serum ferritin of the pregnant women in the third trimester was significantly higher than the others in the rural but was not significantly different ($p>0.05$) from that of women in the first trimester in the urban areas (Table 3). From the result, it was observed that prevalence of iron deficiency was associated with the women's trimester only in the rural areas ($X^2 = 6.70$, $p = 0.035$) but not in the urban areas ($X^2 = 2.79$, $p = 0.248$). Also, iron deficiency was more prevalent in the rural (15.0%) than in the urban (13.0%). However, in both locations, women in their second trimesters were more iron deficient than the others (26.3% in the rural and 18.4% in the urban). Serum ferritin is a measure of the amount of iron in body stores if there is no concurrent infection. When infection is present, the concentration of ferritin may increase even if iron stores are low; this means that it can be difficult to interpret the concentration of ferritin in situations in which infectious diseases are common (WHO, 2005).

Table 2: Trimester-specific mean haemoglobin and prevalence of anaemia among pregnant women in the rural and urban locations

			Prevalence (%)				
Trimester	N	Mean±SD	Not Anaemic	Mild anaemia	Moderate anaemia	Severe anaemia	Chi square (X^2)
Rural							
First	50	10.41±1.32[b]	42.0	30.0	28.0	0.0	72.16 (0.00)
Second	76	65.45±11.35[a]	97.4	0.0	1.3	1.3	
Third	74	10.45±1.07[b]	33.8	40.5	25.7	0.0	
Total	200	31.34±27.68	60.0	22.5	17.0	0.5	
Urban							
First	51	69.06±15.22[a]	96.1	0.0	2.0	2.0	29.14 (0.00)
Second	75	65.56±11.41[a]	97.3	0.0	2.7	0.0	
Third	74	10.64±0.98[b]	39.2	41.9	18.9	0.0	
Total	200	46.13±29.20	75.5	15.5	8.5	0.5	

[a, b, c]Means±SD in the same column with similar superscripts for each location are not significantly different from each other (p>0.05). Chi square test is based on "not anaemic" and "anaemic"

Table 3: Trimester-specific mean serum ferritin and prevalence of iron deficiency among pregnant women

			Prevalence (%)		
Trimester	N	Mean±SD	Iron deficient	Normal Iron stores	Chi square (X^2)
Rural					
First	25	18.21±2.57[b]	4.0	96.0	6.70 (0.035)
Second	38	13.55±2.60[c]	26.3	73.7	
Third	37	24.89±13.38[a]	10.8	89.2	
Total	100	18.91±9.68	15.0	85.0	
Urban					
First	25	17.70±2.64[b]	4.0	96.0	2.79 (0.248)
Second	38	15.29±3.23[b]	18.4	81.6	
Third	37	22.58±11.94[a]	13.5	86.5	
Total	100	18.59±8.23	13.0	87.0	

[a, b, c]Means±SD in the same column with similar superscripts for each location are not significantly different from each other (p>0.05)

Table 4: Trimester-specific prevalence of iron deficiency anaemia among pregnant women

	N	Not anaemic	Anaemic N (%)	Status N (%)
Rural				
First	25	0 (0.0)	1 (100.0)	IDA
Second	38	10 (100.0)	0 (0.0)	
Third	37	0 (0.0)	4 (100.0)	IDA
Total	100	10 (66.7)	5 (33.3)	IDA
Urban				
First	25	1 (100.0)	0 (0.0)	
Second	38	7 (100.0)	0 (0.0)	
Third	37	1 (20.0)	4 (80.0)	IDA
Total	100	9 (69.2)	4 (30.8)	IDA
General				
First	50	1 (50.0)	1 (50.0)	IDA
Second	76	17 (100.0)	0 (0.0)	
Third	74	1 (11.1)	8 (88.9)	IDA
Total	200	19 (67.9)	9 (32.2)	IDA

Iron deficiency anaemia is recognized when an individual is both iron deficient and anaemic. Table 4 above shows the percentage of the pregnant women in the different trimesters that were both iron deficient and anaemic. Table 4 revealed that a total of 32.2% of the pregnant women had iron deficiency anaemia. Only 50% (½) of the women in the first trimester who were iron deficient were anaemic while majority (88.5%, 8/9) of the women in the third trimester who were iron deficient were actually anaemic.

Among the pregnant women in the rural areas, all the women that were iron deficient in the first (100%, 1/1) and third trimesters (100%, 4/4) were equally anaemic. This showed that iron deficiency anaemia was prevalent at 33.3% (5/15) among the rural pregnant women studied. The result in Table 4 further revealed that none (0%) of the women in their first and second trimesters had iron deficiency anaemia but 80% (4/5) of the pregnant women in the third trimester that were iron deficient were equally anaemic. Therefore the 30.8% (4/9) of the pregnant women in the urban area who had iron deficiency anaemia were all in the third trimester. This result therefore indicated that iron deficiency anaemia was a major health problem in both the rural and urban areas among pregnant women in their third trimester in this study.

Iron deficiency anaemia may develop during pregnancy because of the increased iron needed to supply the expanding blood volume of the mother and the rapidly growing foetus and placenta. The amount of iron required during the last half of pregnancy cannot be easily met by diet and therefore the risk of iron deficiency is high, especially toward the end of pregnancy. However, as pregnancy progresses, reduced iron stores trigger an increase in the efficiency of dietary iron absorption, this may be the reason for the reduced prevalence of iron deficiency among the third trimester as compared with the second trimester. Furthermore, the 32.2% prevalence of anaemia recorded among the pregnant mothers in this study was lower than values recorded in some developing countries such as 60-70% recorded in Southeast Asia, 64% in Indonesia (Directorate of Community Nutrition, 1993), 38% in India and the reported Indian national figure of 40-80% by

different authors (Gopalan and Kaur, 1980; Sharma *et al*., 1999). Iron deficiency anaemia has been reported to be associated with increased prenatal mortality, increased child morbidity and mortality, impaired mental development, impaired immune competence, increased susceptibility to lead poisoning and decreased performance at work (Dallam, 1990; Sari *et al*., 2001).

Conclusion: The study revealed that a over 60% of the pregnant women had no form of anaemia, while at the same time greater than 30% of the pregnant women in their third trimester were anaemic. This could be attributed to the higher demands at this period from increased maternal tissues and increased foetal demands.

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