

Full length Research Paper

Studies on the predisposing factors of iron deficiency anaemia among lactating women in Owerri, Nigeria

Okwu G.N.

Department of Biochemistry, Federal University of Technology, P.M.B. 1526 Owerri, Imo State, Nigeria.

E-mail: gnokwu@yahoo.com

Accepted 28 November, 2011

Iron Deficiency Anaemia (IDA) continues to be a major public health problem in developing countries and lactating women are among those at great risk. This study was undertaken to determine some of the factors that predispose lactating women to IDA. A total of 1648 lactating women who were less than six months postpartum (1092 in the Owerri urban area and 556 in the rural areas surrounding Owerri) were recruited for the study. IDA was assessed by measuring haemoglobin (Hb) and the women were considered anaemic for Hb less than 11g/dl according to World Health Organization Standards. Semi structured questionnaires were used to elicit information on possible predisposing factors such as age, level of education, parity, childspacing etc. Results obtained showed that with respect to the effect of age, the younger age category (24 years and below) had significantly ($P<0.0104$) lower mean Hb and significantly ($P<0.0233$) higher percentage of anaemia while the effect of level of education showed that the less educated (no formal education and primary education) had significantly ($P<0.0111$) lower mean Hb and significantly ($P<0.0230$) higher proportion of anaemia. The lactating women with child spacing of less than 1year and 1-1.5years had significantly ($P<0.0330$) lower mean Hb and higher proportion of anaemia while parity did not show any significant effect on both mean Hb and prevalence of anaemia. The implications of these findings are discussed and recommendations made on how to tackle the problem.

Keywords: Iron deficiency anaemia, lactating women, predisposing factors, Owerri, Nigeria.

INTRODUCTION

Iron Deficiency Anaemia (IDA) continues to be a major public health problem in Nigeria especially among women of reproductive age. Prevalence of IDA was recorded in 76.5% of pregnant women in Abeokuta (Idowu et al., 2005) and 62.86% of pregnant women in Enugu (Ekejindu et al., 2006). Okwu et al. (in press) observed a percentage of anaemia among lactating women of 61.29% in Owerri and as high as 74.46% in the rural areas around Owerri.

Iron Deficiency Anaemia among adults results in symptoms like fatigue, breathlessness, irritability etc and is associated with increased risk of infection and lower work capacity and productivity (Brownlie et al., 2004) and in infants may lead to poor psychomotor development and limited learning capacity (Mc Cain and Ames, 2007).

Exclusive breastfeeding is now recommended by all international agencies (WHA, 2001; WHO, 2001) for the first 6 months of life and during this period there is

infant total dependency on maternal nutritional status. Adequate diets for lactating mothers therefore deserve special attention. The extra nutritional requirements of lactating mothers need to be met not only for their interests but also for the well being of their babies.

Although studies have shown that the breast milk concentration of iron is independent of maternal iron status (Domellof et al., 2004), there are nonetheless empirical evidence to show that some women have difficulty breastfeeding due to insufficient milk (Hanafy et al., 1972; Gussler and Briesemister, 1980), a situation that can be caused by a variety of problems including maternal ill health or severe malnutrition (Hanafy et al., 1972, Abakada and Hussan, 1980).

It has been shown that women are often iron depleted postpartum and that postpartum anaemia was greatest in those who were anaemic in pregnancy (Bodnar et al., 2002). Hence steps should be taken to ensure that maternal iron status is adequate early in pregnancy,

throughout pregnancy and during postpartum period. A good strategy to adopt in preventing IDA in lactating women would be to identify factors that predispose them to IDA so that groups at risk are targeted early enough in any planned intervention program.

The present study is aimed at determining the effect of age, level of education, parity and child spacing on the incidence of Iron Deficiency Anaemia among lactating women in Owerri and surrounding rural areas.

MATERIALS AND METHODS

Subjects

A total of 1,648 lactating women (1092 in the urban area and 556 in the rural area) were recruited for the study. The study was carried out at the postnatal clinics of Government hospitals and private clinics in Owerri urban Area and post natal clinics of health centers in the rural areas and covered a period of 11 months.

Approval to carry out the study was obtained from the appropriate health authorities and informed consent obtained from the subjects before the commencement of the study. Lactating women who had health problems such as hypertension, infections, malaria, metabolic disorders etc (as indicated in their medical records) were excluded from the study. All the lactating women in the study were less than 6 months postpartum and were practicing exclusive breastfeeding. Data on age, educational level, parity, child spacing etc were obtained from the lactating women through a semi-structured questionnaire.

Sampling Technique and Sample size

For the Owerri Urban Area, proportionate cluster sampling method was used. Five clusters were identified and one was randomly selected. All the hospitals and clinics in the selected cluster were included in the study. For the rural areas surrounding Owerri, a total of 12 health centers were randomly selected from 55 health centers belonging to 55 autonomous communities.

Sample size n , for random sampling was calculated using the relationship

$$n = (Z_{1-\alpha} / \delta)^2 P(1-P)$$

(WHO 1986)

Prevalence P , was taken to be 0.50, which gives the largest sample size

Sampling error was 5%

Confidence coefficient $1-\alpha = 95$ ($Z_{1-\alpha} = 1.96$)

Accordingly, a minimum sample size of 384 was calculated for the rural areas. To take into account the cluster design effect, the calculated random sampling size, n is multiplied by 2 (Lwanga and Lemeshow, 1991) Hence a minimum sample size of 768 was obtained for the Owerri Urban Area.

Haemoglobin Measurement

Haemoglobin was measured with a portable photometer (Hemocue) which uses disposable sample micro cuvettes with a dry reagent (sodium azide) into which one drop of capillary blood from a finger prick is drawn and then it is placed into the instrument for automatic haemoglobin (cyanomethaemoglobin) measurement. Results are given in 1-2 minutes. This method is highly comparable to laboratory haemoglobin methods in terms of precision (Van Schenck et al., 1986). Anaemia as measured by haemoglobin level, serves as a useful indicator of iron deficiency at population level because it is feasible to assess and because it allows comparisons with findings over time or across populations (Yip et al., 1996). Anaemia is present in lactating women less than six months postpartum when the haemoglobin level falls below 11g/dl, mild for Hb 10 -11 g/dl, moderate for Hb 8 – 10g/dl and severe for Hb < 8.0g/dl (WHO/UNICEF/UN,1996).

Statistical Analysis

Data was analyzed using the software package, SAS version 8 (SAS Institute Inc, Cary North Carolina). Pearson Chi Square, Z test, ANOVA and post Hoc Duncan's Multiple range test were used to identify statistically significant differences. Data was considered significant for $P < 0.05$ at 95% confidence limit.

RESULTS

A total of 1648 lactating women were included in the study (1092 in the urban area and 556 in the rural areas).

In the urban area, 42% of the lactating women were public servants, 38% were involved in some business activity and 20% were housewives or students not holding any jobs. In the rural areas, 12% of the lactating women were public servants, 25% were involved in some business activity and 70% were engaged in subsistence farming as means of livelihood.

Table 1 shows the mean Hb and prevalence of anaemia according to age of the lactating women. Overall, the lactating women below 20years and 20-24years age groups had significantly ($P < 0.0104$) lower mean Hb and significantly ($P < 0.0223$) higher percentage of anaemia than the older groups. In the urban subsample, although the mean Hb of the various age groups did not show statistical difference ($P < 0.8454$) the below 20years age group had the highest proportion (61.90%) of anaemia although not statistically significant ($P < 0.4194$). In the rural areas, the lactating women 24years and below had significantly ($P < 0.0104$) lower mean Hb and significantly ($P < 0.0166$) higher prevalence of anaemia than the older age groups.

Table 1. Mean Hb and Prevalence of Anaemia According to Age of the Lactating Women

Age (yrs)	No of subjects	Hb (g/dl)			%* Anaemia
		Range	Mean	s.d	
<u>Overall</u>					
<20	80	7.20-13.50	9.82 ^{ab}	1.56	70.00
20-24	525	6.40 – 13.60	9.98 ^{ab}	1.67	65.90
25-29	541	6.80 – 13.70	10.10 ^a	1.72	58.59
30-34	311	7.40 – 14.20	10.24 ^a	1.77	56.59
35-39	154	7.80 – 13.60	9.53 ^c	1.46	59.74
≥ 40	37	7.50 – 13.30	9.45 ^c	1.35	62.12
Total	1648				
<u>Urban</u>					
< 20	42	7.40-13.50	10.26 ^a	1.76	61.90
20-24	294	7.60 – 13.60	10.32 ^a	1.48	57.14
25-29	394	7.20 – 13.70	10.34 ^a	1.36	53.55
30-34	223	8.40 – 14.20	10.42 ^a	1.38	52.02
35-39	106	8.30 – 13.60	10.38 ^a	1.54	52.02
≥ 40	33	7.80 – 13.30	10.15 ^a	1.66	57.58
Total	1092				
<u>Rural</u>					
< 20	38	7.20 – 12.90	9.50 ^{ab}	1.46	78.95
20-24	231	6.40 – 13.10	9.64 ^{ab}	1.66	77.06
25-29	147	6.80 – 12.60	9.80 ^a	1.57	72.10
30-34	88	7.40 – 13.20	9.95 ^a	1.38	68.18
35-39	48	7.80 – 13.20	8.92 ^c	1.29	75.00
≥ 40	4	7.50 – 10.00	8.76 ^c	0.78	100.00
Total	556				

Values with different superscripts per column are statistically significant, $p < 0.05$ (ANOVA used) %* Anaemia: Overall $p < 0.0223$, urban $p < 0.04194$, rural $p < 0.0166$ (Pearson χ^2 used).

Table 2 shows the mean Hb and prevalence of anaemia according to educational level. Overall, the no formal education and primary education groups had significantly ($P < 0.0111$) lower mean Hb and significantly ($P < 0.0230$) higher proportion of anaemia than the secondary and post secondary groups. In the urban sub sample, the lactating women with no formal education had significantly ($P < 0.0175$) lower mean Hb and significantly ($P < 0.0116$) higher prevalence of anaemia than the other groups. In the rural area, the no formal education and primary education groups had significantly ($P < 0.0136$) lower mean Hb and higher proportions of anaemia, although not statistically significant ($P < 0.0802$).

Table 3 shows mean Hb and prevalence of anaemia according to parity. Overall, there were no significant differences in mean Hb ($P < 0.2854$) and prevalence of anaemia ($P < 0.1942$) among the lactating women according to parity. The same trend was observed in both the rural and urban areas. In the urban area no statistical difference in mean Hb ($P < 0.3239$) and prevalence of anaemia ($P < 0.6073$) was observed. In the rural area, there were no significant differences in

mean Hb ($P < 0.1354$) and prevalence of anaemia according to parity.

Table 4 shows mean Hb and prevalence of anaemia according to child spacing. Overall, the lactating women with childspacing of less than 1 year and 1-1.5 years had significantly ($P < 0.0330$) lower mean Hb than the other groups. Although there was no significant difference ($P < 0.0638$) in the prevalence of anaemia among the various groups, the less than 1 year childspacing had the highest proportion of anaemia of 67.78%. In the urban subsample, the groups below 1 year and 1 – 1.5 years childspacing had significantly ($P < 0.0134$) lower mean Hb than the other groups although the proportions of anaemia were not significantly different ($P < 0.2447$). In the rural area, no statistical difference in mean Hb ($P < 0.1286$) and prevalence of anaemia ($P < 0.0578$) was observed.

DISCUSSION

The effect of age on the prevalence of anaemia among the lactating women showed that the prevalence of

Table 2. Mean Hb and Prevalence of Anaemia According to Educational Level of the Lactating Women.

Level of Education	No of subjects	Hb (g/dl)			%* Anaemic
		Range	Mean	s.d	
Overall					
No Formal Education	131	7.20-13.60	9.62 ^b	1.44	80.92
Primary Education	458	6.40-13.80	9.88 ^b	1.47	69.21
Secondary Education	718	7.80-14.00	10.37 ^a	1.50	56.86
Post Secondary Education	341	7.30-14.20	10.46 ^a	1.32	53.08
Total	1648				
Urban					
No Formal Education	75	7.20-13.60	9.94 ^b	1.51	72.00
Primary Education	206	7.90-13.80	10.32 ^a	1.45	57.77
Secondary Education	540	7.80-14.00	10.68 ^a	1.38	53.15
Post Secondary Education	271	8.20-14.20	10.75 ^a	1.40	50.18
Total	1092				
Rural					
No Formal Education	56	7.60-12.70	9.25 ^b	1.36	92.86
Primary Education	252	6.40-12.80	9.42 ^b	1.44	78.57
Secondary Education	178	8.10-13.10	9.98 ^a	1.48	66.48
Post Secondary Education	70	7.30-13.20	10.17 ^a	1.39	63.88
Total	556				

Values with different superscripts per column are statistically significant ($p < 0.05$) (ANOVA used) * % Anaemic: Overall – $p < 0.0230$, Urban – $p < 0.0116$, Rural – $p < 0.0802$

Table 3. Mean Hb and Prevalence of Anaemia According to Parity of the Lactating Women

Parity	No of subjects	Hb (g/dl)			% Anaemic*
		Range	Mean	s.d	
Overall					
Primipara	128	7.30-13.00	9.75 ^a	1.48	64.84
1	272	7.50 – 13.10	10.01 ^a	1.51	60.66
2	383	7.90 – 13.50	9.90 ^a	1.52	59.53
3	446	6.40 – 14.00	10.15 ^a	1.72	58.30
4	220	7.60 – 14.20	9.87 ^a	1.60	62.27
> 4	199	7.30 – 13.90	9.79 ^a	1.48	68.34
Total	1648				
Urban					
Primipara	86	7.60-13.00	10.08 ^a	1.52	58.14
1	204	7.70 – 12.90	10.36 ^a	1.57	54.10
2	288	7.90 – 13.50	10.28 ^a	1.48	55.21
3	320	8.00 – 14.00	10.37 ^a	1.78	53.13
4	116	8.20 – 14.20	10.35 ^a	1.55	52.59
> 4	78	7.30 – 13.90	10.29 ^a	1.46	56.41
Total	1092				
Rural					
Primipara	42	7.30 – 12.70	9.53 ^a	1.44	78.57
1	68	7.50 – 13.10	9.76 ^a	1.48	77.94
2	95	8.10 – 12.80	9.96 ^a	1.67	72.63
3	126	6.40 – 13.10	9.98 ^a	1.70	72.22
4	104	7.60 – 13.10	9.35 ^a	1.68	73.08
> 4	121	8.30 – 13.20	9.24 ^a	1.50	76.03
Total	556				

Values with different superscripts per column are statistically significant, $p < 0.05$ (ANOVA used) *% Anaemic: Overall $P < 0.1942$, urban $P < 0.6073$, rural $P < 0.1067$ (Pearson χ^2 used).

Table 4. Mean Hb and Prevalence of Anaemia According to Child Spacing of the Lactating Women

Child spacing	No of subjects	Hb (g/dl)			% * Anaemic
		Range	Mean	s.d	
Overall					
Primipara	128	7.30-13.00	9.75 ^b	1.48	64.84
<1yr	90	6.40 – 13.40	9.68 ^b	1.53	67.78
1-1.5yrs	301	7.20 – 13.00	9.76 ^b	1.46	61.46
1.5-2yrs	532	8.30 – 13.20	10.13 ^a	1.48	61.65
2-2.5yrs	399	8.30 – 14.20	10.24 ^a	1.45	57.64
Above 2.5yrs	198	7.90 – 14.00	10.07 ^a	1.66	60.61
Total	1648				
Urban					
Primipara	86	7.60-13.00	10.08 ^{ab}	1.52	58.14
<1yr	42	7.40 – 13.40	9.75 ^b	1.45	57.14
1-1.5yrs	206	7.20 – 13.00	9.86 ^b	1.57	55.83
1.5-2yrs	348	8.30 – 13.60	10.33 ^a	1.50	54.89
2-2.5yrs	292	8.30 – 14.20	10.74 ^a	1.36	52.40
Above 2.5yrs	118	7.90 – 14.00	10.50 ^a	1.70	53.85
Total	1092				
Rural					
Primipara	42	7.30 – 12.70	9.53 ^a	1.44	78.57
<1yr	48	6.40 – 12.20	9.48 ^a	1.64	77.08
1-1.5yrs	95	8.20 – 12.90	9.62 ^a	1.38	76.84
1.5-2yrs	184	9.00 – 13.20	9.78 ^a	1.46	74.46
2-2.5yrs	107	9.90 – 13.20	9.41 ^a	1.54	71.96
Above 2.5yrs	80	8.40 – 13.00	9.37 ^a	1.62	71.25
Total	556				

Values with different superscripts per column are statistically significant, $p < 0.05$ (ANOVA used) **% Anaemic: Overall $p < 0.0638$, urban $p < 0.02447$, rural $p < 0.578$ (Pearson χ^2 used).

anaemia was higher among the younger lactating women (24 years and below). Okwu and Ukoha (2008) observed higher prevalence of anaemia among younger (24 years and below) pregnant women. It is therefore not surprising that lactating women in that age group have a higher prevalence of anaemia since it has been shown by Bodnar et al (2001) that postpartum anaemia was greatest in those who were anaemic in pregnancy.

The effect of educational level on the prevalence of IDA among the lactating women showed that the less educated (no formal and primary education) had a higher prevalence of anaemia. This is consistent with the findings of Bodnar et al (2004) that greater than 12 years of education was one of the positive predictors of postpartum Hb concentrations among low income women in North Carolina, U.S.A.

Results on the effect of parity showed that parity had no effect on prevalence of IDA among the lactating women. Ogbeide et al (1994) had observed that the prevalence of PEM decreased as parity increased among lactating women in Benin City and Okwu et al (in press) observed the same effect on lactating women in Owerri. It would therefore seem that parity is a negative predictor of PEM but not IDA.

With regards to the effect of child spacing on the prevalence of IDA on the lactating women, those with child spacing of less than 1 year and 1.5 years had significantly lower mean Hb and higher prevalence of anaemia than those with child spacing of more than 1.5 years. A similar effect was observed by Okwu and Ukoha (2008) on pregnant women in Owerri. It therefore seems that as far as iron status is concerned, frequent cycles of pregnancy and lactation is a more critical determinant than the number of children (parity). This would be consistent with the observation that even when food intake is adequate; it may take up to two years to replenish body iron stores after a pregnancy (WHO, 1992).

In conclusion, results from this study indicate that IDA remains a major public health problem among lactating women in Nigeria especially in the rural areas. The groups at greater risk include the younger women, the women with lower levels of education and those with frequent cycles of pregnancy and lactation. The above factors were also identified by Okwu and Ukoha (2008) as positive predictors of IDA in pregnant women. It therefore underscores the point made by Allen (2005) that maternal micronutrient status in the periconcep-

tional period, throughout pregnancy and lactation should be viewed as a continuum and any planned intervention programme should be directed to reproductive age women in general.

It is hereby recommended that well articulated and planned intervention programme should be instituted by governmental and non-governmental agencies to address risk factors way before girls reach age of puberty. This would include

1. Investments in the girl child education and general empowerment of women at all levels.
2. Intensive nutrition education programmes in all Maternal and Child Health (MCH) clinics
3. Free medical services for pregnant women, lactating women and children under five years of age.

ACKNOWLEDGEMENT

The author is grateful to the proprietors of the private hospitals and clinics in Owerri and the nurses at the Government hospitals in Owerri and health centers in the rural areas for their cooperation.

REFERENCES

- Abakada AO, Hussan MA (1980). Nutritional status and dietary intake of lactating Yoruba mothers in Nigeria. *Ecol. food and Nutr.* 10: 105-111
- Allen LH (2005). Multiple micronutrients in pregnancy and lactation: An overview, *Am. J. Clin. Nutr.* 81:12065–12125
- Bodnar LM, Scanlon KS, Freedman DS, Siega-Riz AM, Cogswell ME (2001). High prevalence of postpartum anaemia among Low income women in the United States. *J. obstet. Gynecol.* 185: 4348-43
- Bodnar LM, Siega-Riz AM, Arab L, Chantala K, Mc Donald T (2004). Predictors of Pregnancy and postpartum haemoglobin Concentration in low income women. *Public Health Nutr.* 7(6):701-11
- Brownlie T, Utermohlen V, Hinton PS, Haas JD (2004). Tissue iron deficiency without anaemia impairs adaptation in endurance capacity after aerobic training in previously untrained women. *Am. J. clin. Nutr.* 79(3):437-43
- Domell M, Lonnerdal B, Dewey KG, Cohen RJ, Hernell O (2004). Iron, zinc and copper concentrations in breast milk are independent of maternal status. *Am. J. Clin. Nutr.* 79(1):111-115
- Ekejindu IM, Udigwe GO, Chijioke IRC (2006). Malaria and anaemia in pregnancy in Enugu, Southeast, Nigeria. *Afri. J. Med. Sci.* 35(1) 1-3
- Gussler JD, Briesemister IH (1980) The insufficient milk syndrome: a biocultural explanation. *Med Anthropology* 4(2):145-154
- Hanafy M, Morsey MR, Seddick Y, Habib YA, El Losy M (1972). Maternal nutrition And lactation performance: a study in urban Alexandria. *J. Trop. Pediat. Env. child Health* 18(3):187-191
- Idowu O, Mafiana ACF, Dapo S (2005). Anaemia in pregnancy: a survey of pregnant women in Abeokuta, Nigeria; *African Health Science* 5(4):295-9
- Lwanga SK, Lemeshow S (1991). *Sample size_ Determination in Health Studies: A practical manual.* Geneva, World Health Organization
- Mc Cann JC, Ames BN (2007). An overview of evidence for a casual relation between iron deficiency during development and deficits in cognitive or behavioural function. *Am. J. Clin. Nutr.* 85(4):931-45
- Ogbeide O, Okojie O, Wagbatsoma V, Isah E (1995). Nutritional status of lactating Mothers in Benin City, Nigeria. *Nig. J. Nutr. Sci.* 15 (122):37-39
- Okwu GN, Ukoha AI (2008). Studies on the Predisposing Factors of Iron Deficiency Anaemia among Pregnant women in a Nigerian community. *Pakistan J. Nutri.* 7(1):151-158.
<http://www.pjbs.org/pjnonline/index.htm>
- Van Scheick H, Falkenssons M, Lunberg B (1986). Evaluation of "Hemocue", a new device for determining hemoglobin. *Clinical chemistry* 32:526-529
- World Health Assembly (WHA) 2001. Infant and young child nutrition. *Resolution WHA 54.2*
- World Health Organization (1986). *Sample size Determination: A user's manual.* Geneva WHO (WHO/HST/EMS/86.1
- World Health Organization (1992). *The Prevalence of Anaemia in Women: A tabulation of Available information;* 2nd Ed.
- WHO/MCH/MSM/92.2 Geneva: World Health Organization
- World Health Organization (2001). *Iron Deficiency Anaemia, assessment, prevention and control. A guide for programme managers,* Geneva, Switzerland, WHO
- World Health Organization/UNICEF/UN (1996). Indicators for assessing iron deficiency and strategies for its prevention, WHO, Geneva Switzerland
- Yip R, Stoltzfus R, Simmons E (1996). *Assessment of the Prevalence of the nature of iron deficiency for populations: the utility of comparing haemoglobin distributions.* In: Hallberg, L and Asp, N.G. eds; *Iron Nutrition in Health and Disease*, pg 31-48. John Wiley, London, U.K.