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Prevalence of Iron Deficiency Anaemia among Under-five Children in Imo State, Nigeria

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Abstract: The study was undertaken to find the prevalence of iron deficiency anaemia, among under-five children in Imo State of Nigeria. A cross-sectional survey method was used for data collection .The sample was randomly selected to cover the three geopolitical zones in Imo State. A total of four hundred (400) under-five children were selected by purposive sampling method. Two hundred were from the urban and another two hundred from the rural locations. Height, weight, and mid-upper arm circumferences of the children were measured. Dietary intake for 20% of the sub sample using a three day food record method was adopted. Food samples were analyzed for proximate composition. Blood samples for determination of serum ferritin, and vitamin C levels were obtained by vein puncture. Structured and validated questionnaire was administered to elicit information related to socio-economic status of the parents and health status of the children. The results showed that 48.1% were iron deficient although iron intakes were above recommended allowances. Vitamin C necessary for iron absorption was below recommended allowances. Variables strongly associated with iron deficiency were previous health status of the child, diarrheal treatment, feeling sleepy, tired and weak, complementary feeding timing, and worm infestation topped the list.

Key words: Iron deficiency, serum ferritin, phytates, children

INTRODUCTION

Infants and young children are at particular risk of under-nutrition because of high demands for energy and essential nutrients at this stage of rapid growth (Partnership for *child* development, 1998; Lwambo *et al*, 2000).The period from 6 to 60 months is of paramount importance nutritionally. Growing children are usually very active and so have high nutritional needs. The first three years of life are when important micronutrient deficiencies of vitamin A and iron mostly occur in children." Micronutrient" is the collective term applied to essential vitamins and trace minerals (Black, 2003*)*. Inadequate intake of these is now recognized as an important contributor to the global burden of disease and disability such as mental impairment.

Deficiencies of some micronutrients are highly prevalent in low-and middle-income countries. They increase risk of illness or death from infectious diseases by reducing immune and non-immune responses as such compromise normal physiology and development.

Iron deficiency was defined by Yip and Lynch (1998*)* as functional tissue iron deficiency and the absence of iron stores with or without anaemia. Iron deficiency is defined by abnormal iron biochemistry with or without the presence of anaemia. Iron deficiency is usually the result of inadequate bioavailability of dietary iron. Increased iron requirement during a period of rapid growth (pregnancy and infancy) and/ or increased blood loss such as gastrointestinal blood loss due to schistosomiasis.

Iron Deficiency Anaemia (IDA):

The prevalence of iron deficiency, which is usually detected by low serum ferritin concentration, is estimated to be from 2.0 to 2.5 times the prevalence of anaemia. Mannar (1999*)* stated that iron deficiency anaemia is the most severe degree of iron deficiency and occurs if the haemoglobin (Hb) concentration falls below a threshold level. For every case of iron deficiency anaemia in a population there are thought to be at least two cases of iron deficiency. Iron deficiency anemia is the most common form of anaemia. When IDA occurs, evidence can be seen under a microscope in that the red blood cells appear small and show less colour, resulting in a microcytic, hypochromic anaemia. Iron deficiency anaemia can be detected by a blood measurement called haematocrit.. Values below 35 to 37% suggest iron deficiency anaemia. An even more

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accurate measure is blood haemoglobin. A value of less than 10-11g/dl also suggests iron deficiency anaemia. A common cause of iron deficiency anaemia in children is an over reliance on milk, a very poor source of iron, and too little meat in their diets (Wardlaw *et al*., 2004). Other dietary factors associated with anaemia include frequent consumption of inhibitors, such as tea (Adish *et al.*, 1999). More than two million people worldwide are anaemic and much of it due to iron deficiency. The World Health Organization (WHO) estimates that most pre school children and pregnant women in developing countries and at least 30-40% in developed countries are iron deficient.

In view of the deleterious effects of iron deficiency anaemia on mental development of children ,this study is undertaken to find the prevalence of iron deficiency anaemia among under-five children in Imo State of Nigeria with a view to proffering suggestions for improvement and intervention.

MATERIALS AND METHODS

This study was done in Imo State, Nigeria. It involved socio-economic characteristics of under-five parents, health status of mother during pregnancy. health status of under-five children. and nutrition knowledge of parent The following biochemical tests were carried out using the blood samples:Haematocrit (PCV) levels, C-Reactive protein, Malaria parasite, Ascorbic acid, and Serum ferritin levels.

Stool samples were collected to check for worm (helminthes) infestation. Food records which involved weighing of actual foods consumed by under-fives for three consecutive days, including one day weekend were taken. The samples of meals consumed were analyzed in the laboratory to find out their contents of the following nutrients: Energy (kilogrammes)Protein (grammes)Fat (grammes)Carbohydrate (grammes)Iron (mg) and Ascorbic acid (mg)

The questionnaire responses were coded. The mean energy, protein, fat, iron, and vitamin C values for three days dietary intake for each subject were calculated. Those that were not in food tables were analyzed using the AOAC (1980 and 1990*)*, and Uzoma *et al,* (2002).

Statistical analyses were carried out using the Statistical Package for Social Sciences (SPSS/PC). Data were presented as means, standard deviations (S.D) and percentiles. Student's T – test, and analysis of variance (ANOVA) were determined for the variables. Pearson's correlation, stepwise linear multiple regression analyses were carried out to evaluate the association of food and nutrient intake and other parameters with iron status indices. The level of significance was taken as $P< 0.05$.

RESULTS AND DISCUSSION

Using the cut off of <12.mg/l (WHO, 1994*)*, 51.2% of the children studied had normal iron levels and 48.8% were iron deficient (Fig. 1)

A low concentration of serum ferritin (SF) <12mg/l is indicative of depleted iron stores *(*Hercberg *et al*, 1985). The overall high prevalence of anaemia in under-five children agrees with reports from Sub-Saharan Africa, East Africa and some other WHO regions (Stoltfzfus *et al,* 2002; Tatala, 2004*).* It also agrees with the results of Sumarno and Komari (2004*)* among Indonesian children. A few, 55.5%, pre-school children had iron deficiency anaemia.

Prevalence of Iron Deficiency Based on Location:

The prevalence of iron deficiency in urban and rural settings showed that more children from rural areas (61%) were more iron deficient than those from urban (45.6%) areas.

The children between 12-60 months old had a mean serum ferritin concentration of 1.08g/dl.

Iron deficiency was related with age range ($p<0.01$) among children in general as well as children from urban and rural areas. Rural children had 39.0% normal iron level and 61.0% were deficient. However, 54.4% of the children in urban areas had normal levels and 45.6% were iron deficient (Fig 2 a & b**).** However, more children in rural areas (61.0%) were iron deficient. This showed that there is a significant iron deficiency difference betweens location ($P< 0.05$).

Prevalence of Iron Deficiency Based on Age Group and Gender:

Among the girls studied 51.7% were iron deficient. Among the boys, 45.6% were iron deficient. There was marked differences in prevalence of iron deficiency between the age grades. The least affected was the 24-35 months olds (18.5%) followed by 12-23 months olds (20%) and 36-47 months olds (22.6%). The 48-60 months children had highest prevalence of 39 %.

Fig. 3 shows the prevalence of iron deficiency in age groups. The girls, 12-23 months old had 22.4% of those who were iron deficient against 17.0% of boys. Another 22.4% of girls were iron deficient in 24-35 months age group as against 13.6% of boys. The prevalence for boys was 26.1% and 43.2% in 36-47 and 48-60 age groups and 19.6% and 35.5% for girls in the same age groups. These observed variations were not significant (P>0.05%) between the girls and the boys.

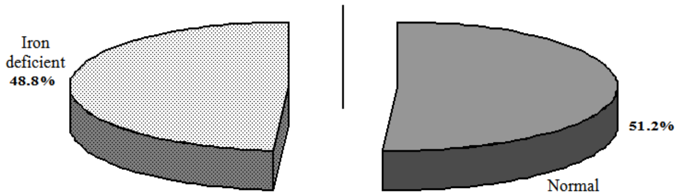

Fig. 1: Level of iron deficiency in under-five children

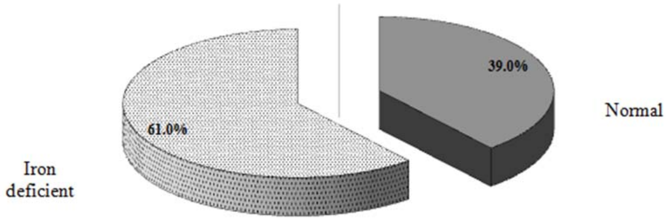

Fig. 2(a): Prevalence of iron deficiency in children based on location -Rural

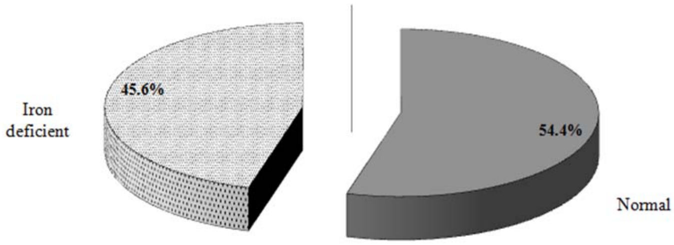

Fig. 2(b): Prevalence of iron deficiency in children based on location -Urban

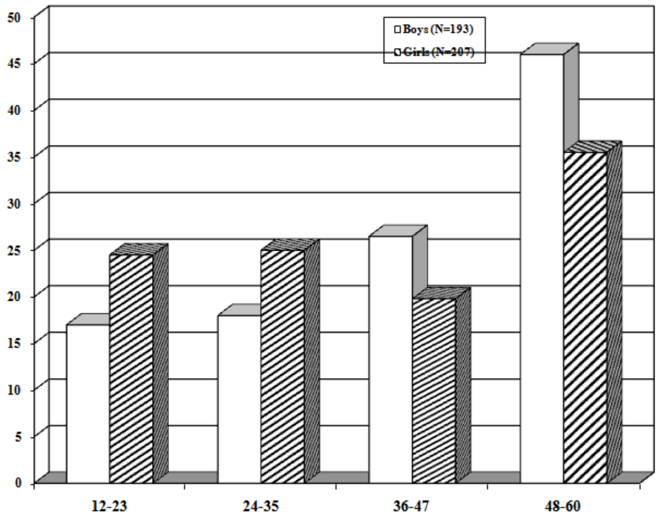

Fig. 3: Prevalence of iron deficiency based on gender and age group

Table 1: Association of parasitic infestation with iron deficiency.

Parasite	Normal iron n=205	Low iron (n=195)	Total	Pearson's Coefficient
Helminthic Have helminthes	15(20.5%)	58(79.5%)	73(100%)	-0.279* (0.001)
No helminthes	190(58.1%)	137(41.9%)	327(100%)	
C- Reactive				
At high risk	22(28.9%)	54(71.7%)	76(100%)	--0.305*
At mild risk	31(35.2%)	57(64.8%)	88(100%)	(<0.001)
At no risk	152(64.4)	84(35.62%)	236(100%)	

The association between parasitic infection and iron deficiency anaemia is shown in Table 1 Correlation was significant at 0. 01 levels (p<0. 01).

Table 1 showed 79.5% of the children who had helminthes were iron deficient as against 41.9% of those without helminthes. It can be deduced that parasitic infestation significantly affected (p<0.01) the ferritin level of the children, and as such predisposed them to iron deficiency. The children who had any form of worm were more iron deficient (79.5%), than others (20.5%).

This result is in agreement with the result of others (Asinobi and Onimawo, 2007; Stoltfzfus, 1997). They observed that 51% of the anaemic children were iron deficient and that if hookworm could be reduced by as much as 25% ,it would reduce iron deficiency anaemia by 35%.

Conclusion:

Less than 50% of the children were iron deficient (48.8%). Worm infestations, malaria parasites and elevated C-reactive protein militated against iron status of the subjects as well as locations. More children were iron deficient in rural areas (61.0%) than 45.6% in urban communities

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