

Caregivers' knowledge and perception of iron content in common staple foods consumed in Southeastern Nigeria

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Abstract

Background: Iron-deficiency anemia remains a major cause of morbidity and mortality of children in our environment. The knowledge of its function and food-rich sources of iron among mothers and/or caregivers will go a long way to mitigate the growth and developmental consequences of iron deficiency in children.

Methods: Due to the high prevalence of iron-deficiency anemia in our locality, we set out to determine the knowledge of mothers and/or caregivers of the richest source of iron among all staple foods commonly consumed in our locality and their awareness of cooking methods that degrade the dietary iron. This cross-sectional hospital study conducted over an 8-month period recruited and interviewed 407 mothers/caregivers attending the Children's Outpatient Clinic of the Enugu State University Teaching Hospital using illustrated self-administered questionnaires.

Results: A vast majority (90.9%) were aware of dietary iron, but when further questioned about its source and function, almost all respondents (99.2%) considered unripe plantain as the richest food source of iron. None chose cowpea which contains the highest iron content. Likewise, none identified cooking practices that reduce dietary iron availability. Eighteen (4.4%) correctly recognized individuals at the highest risk for iron deficiency, whereas only 5 (2.4%) and 1 (0.3%), respectively, correctly selected all the correct functions of iron and ways it can be lost in the body.

Conclusion: Respondents in our study have absolutely no knowledge of cowpea, the richest and cheapest sources of iron in our environment. There is consequently a need to create a comprehensive nutritional campaign, especially during antenatal and well-child clinic visits, to educate parents/caregivers on local and readily available iron-rich food sources and cooking practices while discouraging cooking practices that could potentially degrade elemental iron in these food sources.

Keywords: Iron, knowledge, Southeastern Nigeria, staple food

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INTRODUCTION

Iron is an important micronutrient involved in hemoglobin production. It has also been shown to play an essential role in

neuronal function and optimal development of the brain. Hence, children with iron deficiency have been shown to have poor school performance. Iron deficiency is a common cause of anemia in children.^[1,2] The major source of iron in humans is nutritional,

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and the iron content of some Nigerian foods and the effect of their procession modalities on their net iron content have been documented in some studies.^[3-7] The various channels through which iron can be lost from the human system are also available in literatures.^[8,9] Therefore, iron level in an individual will depend on iron content of the individual's foods, how these foods were processed and the rate at which iron has been lost from the individual's system. Based on our personal experience with parents and/or caregivers of children seen in the Pediatric Out- and Inpatient Department of the Enugu State University Teaching Hospital (ESUTH), there is a common and erroneous belief among parents and caregivers that unripe banana is the richest source of elemental iron in diets. This is contrary to documented evidence which shows that cowpea contains 8.27 mg iron per 100 g sample^[10] of elemental iron compared to unripe plantain which has 2.53 mg iron per 100 g sample of elemental iron.^[11] With high prevalence of micro- and macronutrient deficiency in Nigeria, the knowledge and perception among parents and/or caregivers regarding common foods with the highest iron content, roles of iron in development of the child, how iron can be lost from the body, and food processing techniques that can affect the bioavailability of dietary iron in a child's diet is important. This knowledge we imagine would help in proper preparation and preservation of food with rich iron content needed for proper hematological and neurological development of the child. This cross-sectional study was, therefore, designed to ascertain caregivers' knowledge and perception concerning iron and its availability in common Nigerian foods.

METHODS

This is a cross-sectional and descriptive study conducted among the caregivers of children attending the Children's Outpatient Clinic of the ESUTH, Parklane, Southeastern Nigeria. The study was conducted over an 8-month period spanning May–December 2019 using illustrated self-administered questionnaires. The questionnaires were self-administered and trained research assistants were available to provide explanations when required. The first section of the questionnaire obtained the biodemographic profiles of the respondents which were categorized as follows: age which was categorized into the following: 20–24 years, 25–29 years, 30–34 years, 35–39 years, and >40 years; gender of respondents (male or female); highest attained educational level stratified into primary or lower; and completed secondary and postsecondary education. The occupation of respondents was categorized into unemployed, unskilled, semi-skilled, and skilled workers. Other demographic variables obtained included the socioeconomic status of respondents categorized as low, middle, and high and number of children the respondents have nursed in the past 2 years grouped into ≤4 and >4 children.

The second section of the questionnaire surveyed the general knowledge of respondents concerning iron in terms of its function, availability in the common staple foods by asking them to identify the food with the richest source of iron, and the group of people at risk of iron deficiency. To enhance understanding of the concepts, pictures of the common staple foods under study were illustrated in the questionnaires. Other information obtained included the food processing methods that affect the bioavailability of iron and the various ways iron could be lost from the body.

Ethical approval was obtained from the Ethics and Research Committee of the ESUTH, and informed consent was obtained from the caregivers in language they understand. All the data obtained were recorded into Microsoft Excel sheet and analyzed using SPSS version 19 (SPSS Inc., Chicago, IL, USA) software. Continuous variables were reported in percentages. Participants with significant missing data were excluded from the analysis.

RESULTS

Characteristics of study participants

Table 1 shows the sociodemographics of study participants. In all, 407 respondents were enrolled in the study. Majority (97.6%) were women, with only 7 (2.4%) being male. Seventy-nine (19.6%) were 29 years or younger and 50 (12.4%) were over 40 years of age. Slightly over one-third were in the 30–34 years (30.8%) and 35–40 (37.2%) years' age categories. Respondents with completed secondary education made up 42.8% of the respondents, whereas those with primary education or less and postsecondary education accounted for 9.3% and 47.9%, respectively. Seventy-one (19.8%) of the study participants were skilled and/or senior worker with occupations such as professionals, managers, large-scale businessmen, and contractors. One hundred and twenty-eight (31.4%) were semi-skilled and/or mid-level workers such as intermediate grade civil servants, senior schoolteachers, and nurses, whereas 93 (25.5%) are unskilled and/or junior grade workers such as artisans, junior school teachers, drivers, artisans, petty traders, laborers, and messengers. The remaining seventy-two (19.8%) respondents were unemployed. About 1-in-10 of those interviewed had nursed more than 4 children under the age of 5 in the past 2 years, whereas the vast majority, 335 (87.0%), had nursed ≤4 children [Table 1].

Perception of properties of elemental iron among respondents

Tables 2 and 3 summarize the responses of participants to their knowledge and perception of elemental iron and its properties in group and development of children. A vast majority (90.9%) stated that they have heard of dietary iron, but when further questioned about its properties, they had inadequate knowledge of its source and function. When asked about the function of iron in

Table 1: Sociodemographic characteristics of respondents

Characteristics	Variables	n (%)
Age of respondents (years) (n=403)	≤29	79 (19.6)
	30-34	124 (30.8)
	35-40	150 (37.2)
	>40	50 (12.4)
Gender of respondents (n=381)	Male	9 (2.4)
	Female	372 (97.6)
Educational attainment of respondents (n=407)	Primary or lower	38 (9.3)
	Completed secondary	174 (42.8)
	Postsecondary	195 (47.9)
Occupation of respondents (n=364)	Unemployed	72 (19.8)
	Unskilled worker	93 (25.5)
	Semi-skilled	128 (31.4)
	Skilled worker	71 (19.5)
Socioeconomic status of respondents (n=407)	Low	125 (30.7)
	Middle	149 (36.6)
	High	133 (32.7)
Number of children U5 nursed in the past 2 years (n=385)	≤4	335 (87.0)
	>4	50 (13.0)

the child, 194 (24.4%) and 11 (1.4%) stated that it helps in blood formation and brain development, respectively, with only 5 (2.4%) correctly indicating that it aids both in blood formation and brain development. Other incorrect responses are shown in Table 2. When questioned on the food type with the highest content of iron, all (99.2%) but three respondents picked unripe plantain. One (0.3%) mentioned maize and 2 (0.5%) soya beans as food source with the highest iron. None mentioned cowpea. On the inquiry about a group of individuals prone to iron deficiency, 281 (29.4%) listed pregnant women, premature babies 136 (14.2%), menstruating females 118 (12.4%), malnourished children 103 (10.8%), infants 313 (32.8%), and 4 (0.4%) stated young males. However, only 18 (4.4%) respondents correctly mentioned all the four categories of people at risk of iron deficiency [Table 3]. Regarding food processing technique that affects the bioavailability of iron in food, over half (55.2%) incorrectly mentioned frying and about one-third (3.7%) had no idea. The remaining incorrectly listed

dehausting (1.3%), fermenting (8.8), and drying (4.0%). Finally, 221 (46%) respondents did not know ways iron can be lost from the body. One hundred and twenty-seven (26.5%) mentioned menstrual bleeding, a similar proportion (26.0%) of respondents mentioned nonmenstrual bleeding, whereas 7 (1.5%) mentioned hookworm infestation as a potential route of iron loss. Only one (0.3%) correctly identified the three listed ways through which iron can be lost from the body.

DISCUSSION

The finding of this study showed that there was a high recognition of iron in diet but poor knowledge of its food sources and preparation process that reduce its bioavailability. This finding is particularly worrisome as the World Health Organization in 2002 recognized iron deficiency and the associated anemia as one of the most important contributing factors to the global burden of disease.^[12] This is because anemia, which is the most consequential effect of iron deficiency, poses an increased risk not only to cognitive and physical development of children but also has a negative effect on physical and work productivity of adults.^[13]

Our study revealed that only a small proportion of surveyed participants had complete knowledge of the importance of iron in the body, people prone to iron deficiency, and the various ways elemental iron can be lost from the body. A similar study on 330 women conducted in Gaza strips reported that 84% of the respondents could not tell if a person was anemic, 81.3% of them were not aware of the consequences of iron-deficiency anemia, and 91.6% had no knowledge of the causes of iron-deficiency anemia. This poor knowledge of the importance of iron is troubling because without proper understanding of the value of iron in the development and functioning of the body, many caregivers would not know how to appropriately source for iron rich foods.^[14]

It was also noted from our study that none of the study participants knew that cowpea was among the richest source of dietary iron available in our setting or the culinary practices that degrade and/or reduce its bioavailability in food sources. This study finding is worse but comparable to the finding of another study, which reported that 89% of its respondents did not know any iron-rich foods whereas 74.8% did not know which foods reduce iron absorption. The referenced study also noted that 56.5% of the respondents did not consider anemia to be a serious condition.^[14] With 83.5 million children under 5 years, 17.2 million pregnant women, and over 69.8 nonpregnant individuals affected by iron-deficiency anemia in Africa,^[15] there is an urgent need to intensify nutritional campaign among mothers and caregivers in our setting on the indispensability and importance of iron in the body systems for optimal functionality.

CONCLUSION

We conducted this hospital-based cross-sectional study because of the high prevalence of iron-deficiency anemia in our center^[6] and to ascertain the knowledge of mothers regarding the richest source of dietary iron in our setting. The study has, however, shown that mothers have absolutely no knowledge of cowpea which is one of the richest and cheapest sources of iron in our environment. There is consequently a need to create a comprehensive nutritional campaign,

Table 2: Responses to inquiries regarding of dietary iron among respondents

Subjects	Responses**	n (%)
Function of iron (n=796)	For strong bone	376 (47.2)
	Strong teeth	133 (16.7)
	Blood builder	194 (24.4)
	Brain development	11 (1.4)
	For energy	79 (9.9)
	For fattening	1 (0.1)
	Do not know	2 (0.3)
Food with the richest source of iron (n=392)*	Maize	1 (0.3)
	Unripe plantain	389 (99.2)
	Soya bean	2 (0.5)
Risk group for iron deficiency (n=955)	Cowpea	0
	Pregnant women	281 (29.4)
	Premature babies	136 (14.2)
	Menstruating females	118 (12.4)
	Malnourished children	103 (10.8)
Preparation processes that affect iron bioavailability (n=397)	Infants	313 (32.8)
	Young males	4 (0.4)
	Dehausting	5 (1.3)
	Fermenting	35 (8.8)
	Drying	16 (4.0)
Ways iron can be lost in the body (n=480)	Frying	219 (55.2)
	Don't know	122 (30.7)
	Menstruation	127 (26.5)
	Bleeding	125 (26.0)
	Hook infestation	7 (1.5)
	Don't know	221 (46.0)

** Multiple responses allowed, *Only one response allowed

Table 3: Summary of knowledge and perception of dietary iron among respondents

Subjects	Variables	n (%)
Ever heard of dietary iron (n=406)	Yes	369 (90.9)
	No	37 (9.1)
Adequate knowledge of function of iron (n=406)	Yes	5 (2.4)
	No	401 (97.6)
Knowledge of food with the richest source of iron (n=392)	Correct	0
	Incorrect	392 (100.0)
Correct knowledge of risk group for iron deficiency (n=407)	Yes	18 (4.4)
	No	389 (95.6)
Adequate knowledge of process that reduces iron bioavailability (n=405)	Yes	0
	No	405 (100.0)
Knowledge of ways iron can be lost in the body (n=407)	Correct	1 (0.3)
	Incorrect	406 (99.7)

especially during antenatal and well-child clinic visits, to educate mothers and/or parents on local and readily available iron-rich food sources and cooking practices while discouraging cooking practices that could potentially degrade elemental iron in these food sources.

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Conflicts of interest

There are no conflicts of interest.

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