Global Nutrition and Dietetics

Review Article

Assessment of Dietary Iron Intake and Prevalence Of Anemia Among Salawu Abiola Comprehensive High School And Federal University Of Agriculture, Abeokuta Students

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This article was published in the following Scient Open Access Journal:
Global Nutrition and Dietetics

Received July 05, 2018; **Accepted** July 26, 2018; **Published** August 02, 2018

Abstract

Anemia is a major public health problem but mostly ignored in developing and developed countries. In developing countries, it serves as a primary cause for 40% of maternal death either directly or indirectly. During adolescence anemia is more prevalent in both sexes due to growth spurt especially in girls where they are exposed to risk of onset of menarche. The specific objectives of this project work are to determine the prevalence of anemia among adolescents, estimate the dietary iron intake of adolescents by food frequency questionnaire and to assess the relationship between dietary intake and prevalence of anemia. 140 students within the age 10-19 years were selected from Salawu Abiola Comprehensive High School, four classes were chosen and 35 students from each of the four classes were selected using simple random sampling method and 60 students were selected from FUNAAB using two colleges Colanim and Colplant, two departments were selected from each of the colleges. Students within age 16-19 years who are in 100level were selected using simple random sampling method. Food frequency questionnaire was used to assess dietary iron intake and PCV test was done for 40 students, 20 students from Salawu Abiola Comprehensive High School and 20 from FUNAAB, pallor of palm and conjunctiva was also checked in both schools. The result of the PCV test showed that 45% of FUNAAB respondents are moderately anemic while 55% are normal and among Salawu Abiola High School respondents, 30% are severely anemic, 55% are moderately anemic while 15% are normal. From the result obtained, it is concluded that dietary iron intake is inadequate among the respondents and parents occupation and income affects adolescent dietary intake. It is recommended that adolescents should consume more of iron rich diet and proper feeding allowance should be given to adolescents to enable them afford foods containing these micronutrients. There is also need for appropriate public health dissemination of information on the importance of micronutrient in the prevention of iron deficiency anaemia and food containing these micronutrients.

Key Words: Assessment, Iron Intake, Prevalence, Anemia

Statement of Problem

Anemia is a major public health problem worldwide and is often ignored in both developed and developing countries. Preschool children, pregnant women and adolescents constitute vulnerable group of anemia [1].Adolescence is defined by WHO as period of life spanning the ages between 10-19 years which is a period where both physical as well as psychological changes occur. During childhood, nutritional needs of boys slightly differ from that of girls. But the difference in the nutritional needs widens after the onset of puberty. Iron requirements peak during adolescence due to rapid growth and increase in blood volume. Though this vulnerable period has been focused by existing programmes it has to be constantly enhanced to offset the added burden like menstrual blood loss which precipitates the crisis often. In developing countries parasitic infections and other infectious diseases are more common which peak the requirements of iron in the human body [2]. Iron deficiency anemia is the most common micronutrient deficiency in the world today. It impacts the lives of millions of women and children contributing to poor cognitive development, increased maternal mortality and decreased work capacity. Yet with appropriate public health action, this form of micronutrient malnutrition can be brought under control.

Iron deficiency generally develops slowly and is not clinically apparent until anemia is severe even though functional consequences already exist [3].

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Iron deficiency is the most common form of malnutrition in the world, affecting more than 2 billion people globally. Iron deficiency anemia (inadequate amount of red blood cells caused by lack of iron) is highly prevalent in less-developed countries but also remains a problem in developed countries where other forms of malnutrition have already been virtually eliminated [4].

Objectives of the Study

To assess dietary iron intake and prevalence of anemia among adolescents in Salawu Abiola Comprehensive High School and Federal University of Agriculture Abeokuta.

Specific objectives were to:

1. Determine the prevalence of anemia among adolescents.
2. Estimate the dietary iron intake of adolescents by food frequency questionnaire
3. Assess the relationship between dietary intake and prevalence of anemia.

Literature Review

What Is Anemia?

Anemia occurs when the hemoglobin concentration falls below the normal range for the age and sex of the individual. True anemia arises when there is an imbalance between red cell production and red cell destruction. Types of anemia are : Iron deficiency anemia, sideroblastic anemia, megaloblastic anemia, hypo plastic anemia and hemolytic anemia. The causes includes nutritional deficiency, mal absorption, blood loss etc[5].

According to world health organization (WHO) the hemoglobin level should be 12 g/dl for adolescent girls. If it is less than 12 g/dl it is considered as iron deficiency anemia. According to WHO, if the hemoglobin level is 10 g/dl then it is considered as mild iron deficiency anemia, if the hemoglobin is between 7 g/dl to 10 g/dl then it is considered as moderate iron deficiency anemia and if the hemoglobin is less than 7 g/dl then it is considered as severe iron deficiency anemia [6].

It is estimated that 2000 million people all over the world is suffering with anemia. More than 500 million people are affected, more commonly in under developed countries, where inadequate iron stores can result from inadequate intake of iron (seen with vegetarian diet) or from blood loss (e.g. intestinal hookworm). In the United States of America adolescent girls are 10 times vulnerable to develop anemia than boys [7].

Symptoms of Anemia

Nutritional Anemia Symptoms of anemia are usually very vague and hence, it goes undetected in many people. People tend to ignore these symptoms until they become quite disturbing. Thus, it is necessary to know some of the often ignored symptoms: tiredness, pallor (pale appearance), rapid heartbeats(sensations of pounding heartbeats), headache, dizziness, shortness of breath, loss of sex drive, nervousness, depression, poor concentration, weak memory, easy bruising of body parts, slow healing of wounds, worsening of symptoms of other diseases, angina - heart pain from insufficient oxygen, Claudication - cramped pains in muscles being used, Pica - the consumption of non-food items like wax, dirt, paper, grass or hair is often a symptom of anemia.

Nutritional Causes of Anemia

Relationship of anemia with diet has been proven by various studies which delineated the preponderance of anemia on vegetarians. Dietary iron sources include meat, fish and poultry, lentils, dried beans, grain products, vegetables, dried fruit. Sources of heme iron from hemoglobin and myoglobin found in meat, fish, and poultry are effectively absorbed by receptors in the gut, while the bioavailability of non-heme iron from plants is determined by the presence of dietary factors that enhance or inhibit its absorption. Anemia is caused by inadequate source of iron in diet, it can also be caused by action of inhibitors (calcium, phytate , phenolic etc.) in diet which do not allow iron to be absorb effectively [8,9].

Iron Deficiency Anemia

This is the most common form of anemia. It happens when there is not enough iron in the blood. Blood cells need iron to make hemoglobin. Iron deficiency anemia may happen when there is not enough iron in diet. It may also happen if a lot of blood is loosed. For example, women lose blood during their menstrual periods. Another cause of blood loss may be internal bleeding in the stomach or in the intestine. Pregnant women may have anemia because the baby uses iron to make red blood cells and to grow.

Food Substance That Inhibit Iron Absorption

- Phytate found in the bran of wheat, oats, maize and other cereals strongly inhibit non-haem iron absorption by interacting with it, rendering it less soluble and thus less available for absorption.
- Calcium appears to interfere with the absorption of iron, although the mechanism is unknown.
- Phenolic compounds found in tea, coffee, red wine, some leafy vegetables, nuts and legumes are responsible for the inhibition of iron absorption. It appears to be the galloyl group in these compounds that is responsible for the inhibitory effects.

Tea Drinking And Iron Absorption

Tea drinking mainly influences the absorption of non-haem iron as haem iron is relatively unaffected by tea.

The inhibitory effect of drinking tea on iron absorption was first identified in a study that used test meals fed under experimental conditions. Since this time further studies have examined this effect. These studies concluded that tea does have an inhibiting effect on iron absorption, however it has been proposed that findings from experiments using human or animal models based on test meals fed under experimental conditions may not reflect the role of tea when consumed as part of a complex, real diet [10].

Tea Drinking And Iron Status

Despite tea's inhibitory effect on non-haem iron absorption, it does not necessarily mean that high tea consumption is associated with an unfavourable iron status at the population level.

In an attempt to draw a conclusion about the effect of tea on iron status, a wide variety of studies with different designs, from

different countries, and carried out in different age and gender groups, have been conducted. Results from these studies are conflicting; some have found a higher risk of anemia amongst tea drinkers compared to non-tea drinkers, while others have shown no such association, both in children and adults.

There are many factors that influence an individual's iron stores such as genetic factors, other dietary components, and timing of tea consumption in relation to consumption of non-haem food source as well as iron stores themselves. All of these need to be taken into account when determining the strength of the association between tea consumption and iron status and as such could account for the conflicting results seen in the population studies. Some authors have also concluded that people could adapt to low iron intakes or low iron bioavailability over time and maintain good iron status [11].This needs to be explored in more detail. Furthermore, it is not clear whether tea drinking is a marker of other dietary practices which lead to poor iron status or whether tea has an independent detrimental effect on haemoglobin and ferritin levels.

A couple of review [12].sexamining the role of tea drinking on iron status have concluded that tea consumption does not influence iron status in healthy individuals who are eating a well-balanced diet and who have adequate iron stores as determined by serum ferritin concentrations. Only in populations of individuals with marginal iron status does there seems to be a negative association between tea consumption and iron status [13, 14].

Methodology

Research Design

The study is cross-sectional descriptive survey. Secondary school students and FUNAAB students were used for the research. 140 students from Salawu Abiola comprehensive High School while the other 60 are FUNAAB 100 level students that are still 19 years of age or below. PCV test was done for 40 people from the samples to test the hemoglobin level of the pupils. Food frequency questionnaire was also used to assess the frequency of iron intake.

Method of Selection

Two colleges were chosen in FUNAAB (Colanim and Colplant), two departments were chosen from each of the colleges (ABG, PPCP, PRM and PB & ST) a list was collected from each department and students within age 16-19 years and 100level were selected using simple random sampling method and 60 students were disproportionately selected in FUNAAB. For Salawu Abiola Comprehensive High School, four classes were chosen (jss1, jss2,ss1 and ss2) 35 students were disproportionately selected from each class using simple random sampling method, students selected are within age 10- 19 years and 140 students were selected in Salawu Abiola Comprehensive High School.

Sample Size: 200

Method of Data Collection

- Iron intake was assessed from food frequency questionnaire.
- Biochemical method of assessment was also used by checking the PCV (packed cell volume) level of subsamples (20% of 200). This was done to measure the haemoglobin level. This was done at FUNAAB Health Centre Clinical Laboratory with the aid of a laboratory scientist.
- Clinical method of assessment was used by checking the pallor of the conjunctiva and the palm of pupils.

Result

Table 1 Above shows demographic characteristics of the respondents as follows: for students of SACHS, the table shows 57.9% of the respondents to be female while 2.1% are male. 77.1% are within the age of 10-14 years while 22.9% are within the age of 15-19 years. The table shows 81.1% were in SSS1-3. 87.1% are Yoruba by tribe, 10% are Igbos while 2.9% are Housas by tribe. On the fathers occupation, 33.6% are civil servants, 20.7% are traders, another20.7% are artisan, 8.6% are famers. On the mothers occupation, 46.4% are traders, 23.6% are civil servants, 15% are artisan, 2.1% are farmers. The feeding allowance of the respondents (in Naira); 82.9% receives 20-100 while 17.1% receives more than 100 as their allowance.

Variables	S.A.C.H.S.	Variables	FUNAAB
	Frequency (%)		Frequency (%)
Sex		**Sex**	
Male	59 (42.1)	Male	25 (41.7)
Female	81 (57.9)	Female	35 (58.3)
Age(years)		**Age (years)**	
10 – 14	108 (77.1)	16 – 17	20 (33.3)
15 – 19	32 (22.9)	18 – 19	40 (66.7)
Class			
JSS 1 – 3	114 (81.4)		
SSS1 – 3	26 (18.6)		
Tribe		**Tribe**	
Yoruba	122 (87.1)	Yoruba	44 (73.3)
Hausa	4 (2.9)	Hausa	2 (3.3)
Igbo	14 (10.0)	Igbo	14 (23.4)
Fathers occupation		**Fathers occupation**	
Civil servant	47 (33.6)	Civil servant	31 (51.7)
Trading	29 (20.7)	Trading	13 (21.7)
Farming	12 (8.6)	Farming	4 (6.7)
Artisan	29 (20.7)	Artisan	3 (5.0)
Others	23 (16.4)	Others	9 (15.0)
Mothers occupation		**Mothers occupation**	
Civil servant	33 (23.6)	Civil servant	31 (51.7)
Trading	65 (46.4)	Trading	16 (26.7)
Farming	3 (2.1)	Farming	-
Artisan	21 (15.0)	Artisan	2 (3.3)
Others	18 (12.9)	Others	11 (18.3)
Feeding allowance (Naira)		**Feeding allowance (Naira)**	
20 – 100	116 (82.9)	2000 – 4999	10 (16.7)
> 100	24 (17.1)	5000 – 9999	23 (38.3)
		10,000 – 14,999	16 (26.7)
		15,000 and above	11 (18.3)
Total	**140 (100.0)**	**Total**	**60 (100.0)**

Table 1: Socio demographic characteristics of the respondents.

For students of FUNAAB, the table shows 58.3% of the respondents to be female while 41.1% are male. 66.7% are within the age of 18-19 years while 33.3% are within the age of 16-17 years. 73.3% are Yoruba by tribe, 23.4% are Igbos while 3.3% are Housas by tribe. On the fathers occupation, 51.7% are civil servants, 21.7% are traders, 6.7% are farmers, 5.0% are artisan. On the mothers occupation, 51.7% are civil servants, 26.7% are traders, 3.3% are artisan. The feeding allowance of the respondents (in Naira); 38.3% receives 5000-9999, 26.7% receives 10,000-14,999, 18.3% receives 15,000 and above while 16.7% receives 2000-4999.

Table 2 above shows the prevalence of pallor of conjunctiva in SACHS as follows: 50.7% of the respondents were found to be mildly pale, 35% very pale and 14.3% were found normal. On the prevalence of pallor of palm, the table shows 50.7% of the respondents to be mildly pale, 35% very pale and 14.3% were found normal.

Table 3 above shows the prevalence of pallor of conjunctiva in FUNAAB as follows: 53.3% were found mildly pale, 26.7% very pale and 20% were found to be normal. On the prevalence of pallor of palm, the table shows 53.3% to be mildly pale, 26.7% very pale and 20% normal (Table 6,7,8,9). Above shows various food items commonly consumed by the respondents and their corresponding iron value per 100grams.

Classification	Pallor of conjunctiva frequency(%)	Pallor of palm frequency (%)
Very Pale (+)	49 (35.0)	49 (35.0)
Mildly Pale (++)	71 (50.7)	71 (50.7)
Normal (+++)	20 (14.3)	20 (14.3)
Total	**140 (100.0)**	**140 (100.0)**

Table 2: Prevalence of pallor of conjunctiva and pallor of palm in S.A.C.H.S

Classification	Pallor of conjunctiva Frequency(%)	Pallor of palm Frequency (%)
Very Pale (+)	16 (26.7)	16 (26.7)
Mildly Pale (++)	32 (53.3)	32 (53.3)
Normal (+++)	12 (20.0)	12 (20.0)
Total	60 (100)	60 (100)

Table 3: Prevalence of pallor of conjunctiva and pallor of palm in FUNAAB

Variable	Very pale (+)	Mildly pale (++)	Normal (+++)	X^2	P-value
Sex					
Male	19 (13.6)	29 (20.7)	11 (7.9)	1.63	0.44
Female	30 (21.4)	42 (30.0)	9 (6.4)		
Age					
10 – 14	42 (30.0)	53 (37.9)	13 (9.3)	3.9	0.14
15 – 19	7 (5.0)	18 (12.9)	7 (5.0)		
Fathers Occupation					
Civil Servant	13 (9.3)	28 (20.0)	6 (4.3)		
Trading	6 (4.3)	14 (10.0)	9 (6.4)		
Farming	4 (2.9)	7 (5.0)	1 (0.7)	15.4	0.05*
Artisan	14 (10.0)	12(8.6)	3 (2.1)		
Others	12 (8.6)	10 (7.1)	1 (0.7)		
Mothers Occupation					
Civil Servant	6 (4.3)	21 (15.0)	6 (4.3)		
Trading	23 (16.4)	32 (22.9)	10 (7.1)		
Farming	3 (2.1)	-	-	12.1	0.15
Artisan	8 (5.7)	10 (7.1)	3 (2.1)		
Others	9 (6.4)	8 (5.7)	1 (0.7)		
Feeding Allow					
20 – 100	47 (33.6)	55 (39.3)	14 (10.0)	9.6	0.01*
> 100	2 (1.4)	16 (11.4)	6 (4.3)		

Table 4: Association between the respondents socio-demographic characteristics and prevalence of anaemia in S.A.C.H.S

Discussion of Findings

Salawu Abiola Comprehensive High School Respondents Responsdents

The result reported that 13.6% of male are very pale, 20.7% are mildly pale, 11.9% are normal and for female respondents, 21.4% are very pale, 30% are mildly pale and 6.4% are normal. Higher proportion of female are more anemic than male due to their menarche [15].

The result also shows that there is a relationship between parents level of income especially mothers income which affects the nutritional status of the whole household, the amount spent daily on feeding also affects nutritional status.

The result for Salawu Abiola Comprehensive High School shows that children who spend below ₦100per day are more anemic than those that spend above ₦100per day. Parent's level of income and daily feeding allowance of a child have effect on the child [16, 17].

The result reported that most of the respondents do not consume iron rich diet often, for green vegetables,45% of the respondents consume green vegetables less than four times in a week, 50% consume it above four times in a week while 5% never consume it. Also for okro which is a very good source of iron, 45.7% of Salawu Abiola Comprehensive High School respondents

Variable	Very pale (+)	Mildly pale (++)	Normal (+++)	X^2	P-value
Sex					
Male	4 (6.7)	15 (25.0)	6 (10.0)	2.53	0.28
Female	12 (20.0)	17 (28.3)	6 (10.0)		
Age					
16 – 17	7 (11.7)	9 (15.0)	4 (6.7)	1.17	0.56
18 – 19	9 (15.0)	23 (38.3)	8 (13.3)		
Fathers Occupation					
Civil Servant	11 (18.3)	17 (28.3)	3 (5.0)		
Trading	1 (1.7)	7 (11.7)	5 (8.3)		
Farming	2 (3.3)	2 (3.3)	-	12.56	0.13
Artisan	1 (1.7)	2 (3.3)	-		
Others	1 (1.7)	4 (6.7)	4 (6.7)		
Mothers Occupation					
Civil Servant	12 (20.0)	16 (26.7)	3 (5.0)		
Trading	2 (3.3)	11 (18.3)	3 (5.0)		
Artisan	-	2 (3.3)	-	15.3	0.02*
Others	2 (3.3)	3 (5.0)	6 (10.0)		
Feeding Allow					
2,000 – 4,999	5 (8.3)	4 (6.7)	1 (1.7)		
5,000 – 9,999	8 (13.3)	15 (25.0)	-		
10,000 – 14,999	3 (5.0)	9 (15.0)	4 (6.7)		
15,000 and more	-	4 (6.7)	7 (11.7)	23.3	0.001*
Total	**16 (26.7)**	**32 (53.3)**	**12 (20.0)**		

Table 5: Association between the respondents socio-demographic characteristics and prevalence of anaemia in FUNAAB

Food items	Iron value content per 100 grams
Rice (boiled polished rice)	0.3mg
Wheat (whole grain paste)	4.7mg
Maize (boiled yellow)	1.3mg
Groundnuts (boiled)	3.9mg
Cashewnuts (boiled)	3.9mg
Moimoi	15%
Green vegetables	4.9mg
Ewedu	2.5mg
Okro	0.8mg
Beef (boiled)	3.5mg
Liver	12.6mg
Kidney	6.9mg
Egg (boiled)	1.7mg
Smoked fish (mackerel fish)	1.0mg
Fresh fish (boiled)	1.0mg

Table 6: Food items and their corresponding iron value

Food group	Number of times consumed per week Frequency (%)		
	Less than four times	More than four times	Never
Cereals and Grain			
Wheat	41 (29.3)	99 (70.7)	-
Maize	74 (32.9)	4 (2.8)	62 (44.3)
Oat	45 (32.1)	8 (5.8)	87 (62.1)
Wheat bread	53 (37.9)	7 (5.0)	80 (57.1)
Legumes			
Beans	90 (64.3)	24 (17.1)	26 (18.6)
Moinmoin	109 (77.9)	14 (10.0)	10 (7.1)
Akara	104 (74.3)	14 (10.0)	22 (15.7)
Groundnut	48 (34.3)	6 (4.3)	30 (21.4)
Cashew nut	53 (37.9)	6 (4.)	
Vegetables			
Green Vegetable	63 (45.0)	70 (50.0)	7 (5.0)
Ewedu	90 (64.3)	34 (24.3)	16 (11.4)
Okro	64 (45.7)	52 (22.9)	44 (31.4)
Meat & Products			
Beef	43 (30.7)	84 (60.0)	13 (9.3)
Liver	45 (32.1)	12 (8.6)	83 (59.3)
Kidney	24 (17.1)	12 (8.6)	104 (74.3)
Fish and Diary			
Egg	61 (43.6)	64 (45.7)	15 (10.7)
Dried fish	78 (55.7)	32 (22.9)	30 (21.4)
Smoked fish	59 (42.1)	43 (30.8)	38 (27.1)
Fresh fish	42 (30.0)	76 (54.3)	22 (15.7)

Table 7: Food frequency pattern of the respondents in S.A.C.H.S

consume okro less than four times, 22.9% of the respondents consume it above four times while 31.4% never consume okro. For animal source of iron, 30.7% of respondents consume beef less than four times, 60% of Salawu Abiola Comprehensive High School respondents consume beef more than four times while 9.3% do not consume beef. For fresh fish, 30% of the respondents consume fresh fish less than four times, 54.3% consume it more than four times while 15.7% of the respondents in Salawu Abiola Comprehensive High School respondents do not consume fresh fish. From the result, it was deduced that most of the respondents do not consume iron rich foods which added to the prevalence rate of anemia in Salawu Abiola Comprehensive High School respondents.

Funaab Respondents

Table 3 shows that among respondents in FUNAAB, 26.7% are very pale according to the pallor of their conjunctiva and palm, 53.3% are mildly pale while 20% of the FUNAAB respondents are normal. Also (Table 4 and 5), shows that 21.7% of the respondents are underweight75% are normal while 3.3% are overweight.

Out of 41.7% of male respondents in FUNAAB 6.7% are very pale, 25% are mildly pale and 10% are normal. Among 58.3% of female respondent, 20% are very pale, 28.3% are mildly pale while 10% are normal. The percentage of females who are pale is higher than male who are pale, females tend to lose more blood due to menstrual blood loss which affects females [18, 19].

The result shows the relationship between parents' level of income and nutritional status of the child. If parents earn larger income, monthly allowance of students will automatically increase which will have a positive effect on their nutritional status. Among respondents who receive between ₦2000 - ₦4999, 8.3% are very pale, 6.7% are mildly pale while 1.7% are normal. For those who receive monthly allowance between ₦5000 - ₦9999,

Food group	Number of times consumed per week Frequency (%)		
Cereals and Grains	**Less than four times**	**More than four times**	**Never**
Rice	19 (31.7)	41 (68.3)	-
Wheat	13 (21.7)	-	47 (78.3)
Maize	23 (38.3)	2 (3.4)	35 (58.3)
Oat	14 (23.3)	-	46 (76.7)
Wheat bread	6 (10.0)	1 (1.7)	53 (88.3)
Legumes			
Beans	44 (73.3)	6 (10.0)	10 (16.7)
Moinmoin	37 (61.6)	1 (1.7)	22 (36.7)
Akara	6 (10.0)	-	54 (90.0)
Groundnut	64 (23.3)	4 (6.7)	42 (70.0)
Cashew nut	1 (1.7)	-	59 (98.3)
Vegetables			
Green Vegetable	28 (46.7)	7 (11.6)	25 (41.7)
Ewedu	7 (11.6)	1 (1.7)	52 (86.7)
Okro	3 (5.0)	2 (3.3)	55 (91.7)
Meat & products			
Beef	32 (53.3)	8 (13.4)	20 (33.3)
Liver	2 (3.3)	1 (1.7)	57 (95.0)
Kidney	1 (1.7)	-	59 (98.3)
Fish and diary			
Egg	35 (58.3)	22 (36.7)	3 (5.0)
Dried fish	10 (16.7)	3 (5.0)	47 (78.3)
Smoked fish	12 (20.0)	3 (5.0)	45 (75.0)
Fresh fish	31 (51.7)	12 (20.0)	17 (28.3)

Table 8: Food frequency pattern of the respondents in FUNAAB

Variables PCV	FUNAAB Frequency (%)	S.A.C.H.S. Frequency (%)
< 22% (severe anemia)	-	6 (30.0)
22 – 33%(moderate anemia)	9 (45.0)	11 (55.0)
> 33%(normal)	11 (55.0)	3 (15.0)
Total	**20 (100.0)**	**20 (100.0)**

Table 9: Packed cell volume (PCV) distribution of the respondents by school

13.3% are very pale and 25% are mildly pale. For respondents who receive monthly allowance between ₦10000 - ₦14999, 5% are very pale,15% are mildly pale and 6.7% are normal and for respondents who receive more than ₦15000, 6.7% are mildly pale while 11.7% are normal. The result shows the relationship between higher level of monthly allowance and good nutritional status of the respondents. This result is in line with that of [20, 21].

The result showed that most of the respondents in FUNAAB do not consume enough iron rich foods which is adding to the prevalence of anemia among FUNAAB students. The result showed that 11.6% of the respondents consume vegetables more than four times while 41.7% never consume vegetables in seven days, 1.7% of the respondents also consume ewedu more than four times while 86.7% never consume it. 3.3% consume okro more than four times in seven days while 91.7% do not consume okro. For animal sources of iron, 36.7% of the respondents consume egg more than four times in seven days while 5% of the respondents do not consume egg. Also, 20% of the respondents consume fresh fish more than four times in seven days while 28.3% do not consume fresh fish in seven days. This result shows the relationship and effect of iron rich diet on nutritional status.

Conclusion

From the results of this study, it is concluded that dietary iron intake is inadequate in adolescents. This implies that people within age 10-19 years do not eat enough iron rich food to sustain their body and to maintain proper body functioning and to increase their PCV.

Finally, it is concluded that parents occupation and feeding allowance have a significant effect on the rate at which adolescents consume iron rich diet which affects their nutrient intake level.

Recommendations

From the result obtained in this research work, it is recommended that:

- There is need for appropriate public health dissemination of information on the importance of micronutrient in the prevention of iron deficiency anaemia and food containing these micronutrients.
- Adolescents should consume more of iron rich foods.
- Adolescents should be given adequate feeding allowance to enable them purchase foods containing these micronutrients.
- Parents should educate children on importance of iron rich diet.

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