

Prevalence of Iron Deficiency Anemia (I.D.A.) among 6-24 Months Old Children Admitted to Azadi Teaching Hospital in Kirkuk Governorate in 2019

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Abstract:

Background: Iron deficiency anemia is a common nutritional problem worldwide and present in developing countries more than developed country.

Aims: 1. To assess how widespread is the Iron deficiency anemia among anemic children between 6 -24 months of age.

2. Study the significant relation of age, sex, and residence of children and education status of the mother of a child with I.D.A.

3. To illustrate the relation of feeding practices and the development of I.D.A. and the relation between nutritional status (Weight for age) of children and I.D.A.

4. To study the relation between gestational age and development of I.D.A.

Patients and methods: This study is performed in Azadi Teaching Hospital in Kirkuk pediatric department during 2019 to investigate the prevalence of IDA in children between six months and 2 years of age. A detailed history taken and physical examination done. serum iron, total iron binding capacity and serum ferritin were checked for the anemic cases.

Results: A total of (90) cases, 60 cases of them (66%) had anemia (P.C.V. less than 33%). Iron deficiency anemia constitutes 50 cases (55.5%) of all cases of anemia. The cases came to hospital complaining from pallor and poor appetite.

The peak age incidence of I.D.A. was between 6-12 months of age. There was no great variation between affected males and females. Most of the cases (32) (64%) were referred from rural areas.

It was noticed that artificial feeding was a common feeding practice in most of the cases. Seventy percent of cases were under 10th centile of their weight for age.

A large numbers of mothers had low educational level .Also the mean age of early introduction of food was (5-12) month.

Conclusion: 1. Peak age of Iron deficiency anemia (I.D.A) is between 6-12 months of age.

2. Iron deficiency anemia is more common among rural children.

3. The majority of infants with I.D.A. were underweight.

4. Early introduction of food from 6 months of age with bad nutritional supplement with no iron contents can lead to I.D.A.

Keywords: Iron deficiency anemia, Serum Iron status, Kirkuk governorate.

Introduction:

Iron deficiency is a common nutritional deficiency worldwide and is considered a significant public health concern in both developing and developed countries.^(1,2)

For young children in the United States, the prevalence of iron deficiency is ~ (15%), and the prevalence of iron deficiency anemia is ~ (2%).⁽³⁾ The prevalence of iron deficiency peaks in

early childhood, a sensitive time for the rapidly developing brain.^(5, 6) Iron deficiency (anemic and nonanemic) has a negative impact on neurodevelopment outcomes.⁽⁶⁾ Iron is vital for the processes of monoamine metabolism, myelin synthesis, and metabolic function of the brain.⁽⁵⁾ Animal studies show that early postnatal iron deficiency alters brain development and cognition.^(7, 8) Impairments in cognitive, social, and emotional functioning may persist into adolescence and young adulthood among individuals who had iron deficiency in early childhood.⁽⁹⁾ There is some evidence that iron supplementation in infants and young children with iron deficiency is associated with improvements in motor and cognitive functioning when treatment is provided for a therapeutically appropriate duration^(10, 11). The American Academy of Pediatrics (AAP) recommends universal screening for anemia through measurement of hemoglobin at 12 months of age.⁽⁴⁾ There are several concerns related to this strategy. First, hemoglobin lacks sensitivity and specificity for iron deficiency, because levels overlap for individuals with iron sufficiency and iron deficiency (sensitivity), and there are several other causes of anemia (specificity).^(4, 12) In contrast to the AAP recommendation, in 2015, the US Preventive Services Task Force found insufficient evidence to recommend routine screening for iron deficiency anemia in young children.⁽¹³⁾ To address knowledge gaps identified by the US Preventive Services Task Force, in 2016, the National Institutes of Health convened an Iron Workshop and an expert panel.⁽¹⁴⁾ The workshop report recognized serum ferritin as the most commonly used indicator of iron

deficiency.^(15, 16) In addition, although there are limited data in young children, studies in adults suggest that the commonly recommended cutoff for serum ferritin is specific as compared with bone marrow aspirate.^(15, 16) The workshop report also recognized that serum ferritin is an acute phase reactant; therefore, concomitant inflammation complicates the use of serum ferritin in the diagnosis of iron deficiency.^(15, 16) To address this, the report provided approaches to adjusting serum ferritin for inflammation using C-reactive protein (C.R.P.) in population surveys.⁽¹⁷⁾

Aims of the study:

1. To determine how widespread is the Iron deficiency anemia. among anemic children between 6 -24 months of age.
2. Study the significant relation of age, sex, and residence of children and education status of the mothers had children with I.D.A.
3. To illustrate the relation of feeding practices and the development of I.D.A. and the relation between nutritional status (Wt/age) of children and I.D.A.
4. To study the relation between gestational age and development of I.D.A.

Patients and methods:

A prospective study was done at Azadi Teaching Hospital pediatrics department in 2019. The samples were children aged from 6 month to 2 years old age, who were admitted to hospital.

Packed cell volume (P.C.V.) was done for (90) cases by micro centrifuging method, cases with P.C.V less than (33%) considered to be anemic. A complete blood picture (C.B.P.) was done to all of them confirming that they have hypo chromic microcytic anemia.

Then S. iron, Total Iron Binding Capacity (T.I.B.C) and S. ferritin were done for anemic cases. Those with Serum iron less than 22 micro gram/dl, Total iron binding capacity more than 400 micro gram/dl and s.ferritin less than 10 microgram regarded as cases of I.D.A. ⁽¹⁹⁾

In this prospective study, data were collected according to preceding questionnaire, which included age, sex, and residence, weight, type of feeding, gestational age, educational level of the mother, history of previous iron therapy and blood transfusion.

The data were analyzed using chi-square test, arithmetic mean and standard deviation. P value was less than 0.05 regard as significant.

Cases with anaemia and normal S.iron ,T.I.B.C. ,S.ferritin were excluded from this study. The nutritional assessment depended on weight for age (wt/age) according to the growth chart.

Results:

Out of 90 cases, 50 were having I.D.A. Table (1) shows that 25 cases (50%) were 6-12 months old, 18 cases (36%) were 13-18 months old and 7 cases (14%) were 19-24 months old, and shows that among the 50 cases with IDA, 26 cases (52%) were male and 24 cases (48%) were female, which makes the gender not significant, And demonstrates that 32(64%) of cases were from rural area and 18(36%) of cases from urban area, also demonstrates that (20%) of cases were preterm and (80%) of cases were full term.

2. Relation between education level of the mother & I.D.A:

Table (2) shows that the number of illiterate mother were 29 cases (58%),

primary educated mother 12 cases (24%), and secondary & Higher Education were 9 cases (18%).

The percentage of the illiterate mother among the cases was (39%), primary (43%) and secondary & high education (18%), then by comparing between the 2 group found that the P-value was significant $p=0.037$.

3.Types of feeding

Figure (1) demonstrates the relation between the types of feeding and the development of IDA in correlation with age, 1000 mothers randomly were asked about feeding their babies showed that (57% were bottle – fed (27%) Exclusively breast-fed and (16%) mixed fed, which means that the relation of IDA to the pattern of feeding is not significant $P = 0.170$

4. Relation between IDA and age onset of weaning:

Table (3) shows that the minimum age of weaning among IDA cases was two months and maximum age was 12 months which makes the mean age of weaning (5-12) month.

Figure (2) show that (66%) of cases have weaning before 5 months of age.

5. Body weight in IDA patients:

Figure (3) shows that 9 cases (18%) had body weight below 3rd centile, 26 cases(52%) between 3rd and 10th centile , 10 cases(20%) between 11th and 50th centile ,while only (20%) of cases fall above 50th centile .

Serum iron ,S. ferritin , Total iron binding capacity(T.I.B.C.) level in IDA cases:

Table (4) shows that the mean level of Total iron binding capacity (T.I.B.C.) is (467.5) micro gram/dl, the mean level of S. iron is (13.36) micro gram/dl and (6.70) microgram is the mean level of S. ferritin.

Table (1): The relation between IDA and age, the relation of IDA with sex, Relation between residency & I.D.A, relation between gestational age & IDA.

Age(month)	Frequency(No.)	Percentage (%)
6-12	25	50
13-18	18	36
19-24	7	14
Total	50	100
Gender	Frequency(No.)	Percentage (%)
Male	26	52
Female	24	48
Total	50	100
Residency	Frequency(No.)	Percentage (%)
Urban area	18	36
Rural area	32	64
Total	50	100
Gestational age	Frequency (No.)	Percentage (%)
Preterm	10	20%
Full term	40	80%
Total	50	100%

Table (2): Distribution of the Education Level of the mother in IDA patients.

Education level of mother	Frequency (No.)	Percentage (%)
Illiterate	29	58
Primary	12	24
Secondary&HigherEducation	9	18
Total	50	100

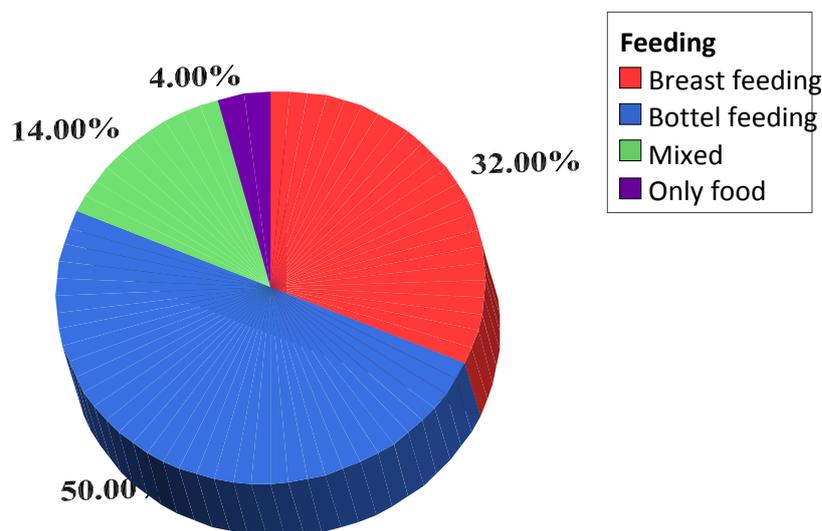


Figure (1): Demonstrates the exclusively breast-feeding and (16%) mixed feeding, which means that there not significant **P=0.170**

Table (3): The relation between age of weaning and IDA

Time of weaning	Minimum	Maximum	Mean	Std.deviation
Months	2	12	5.12	1.46

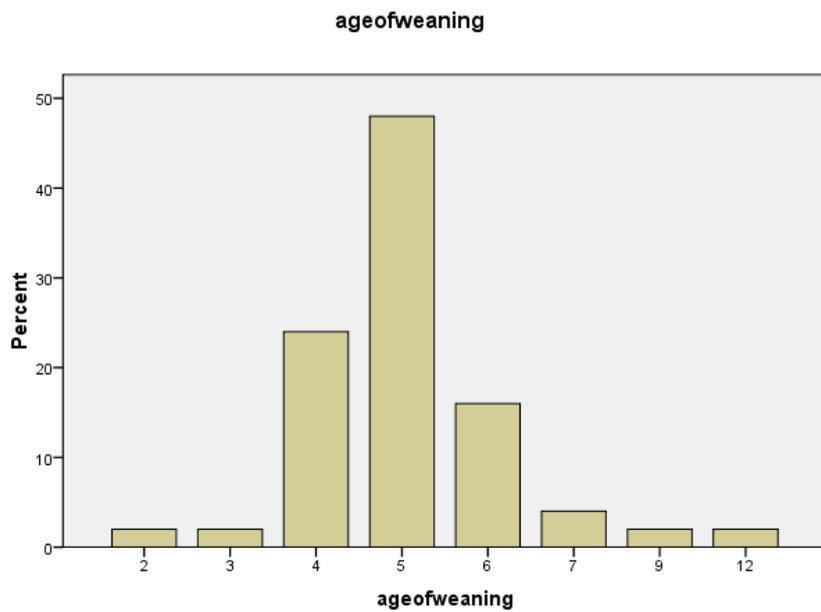


Figure (2): Show the relation between age of weaning and IDA cases.

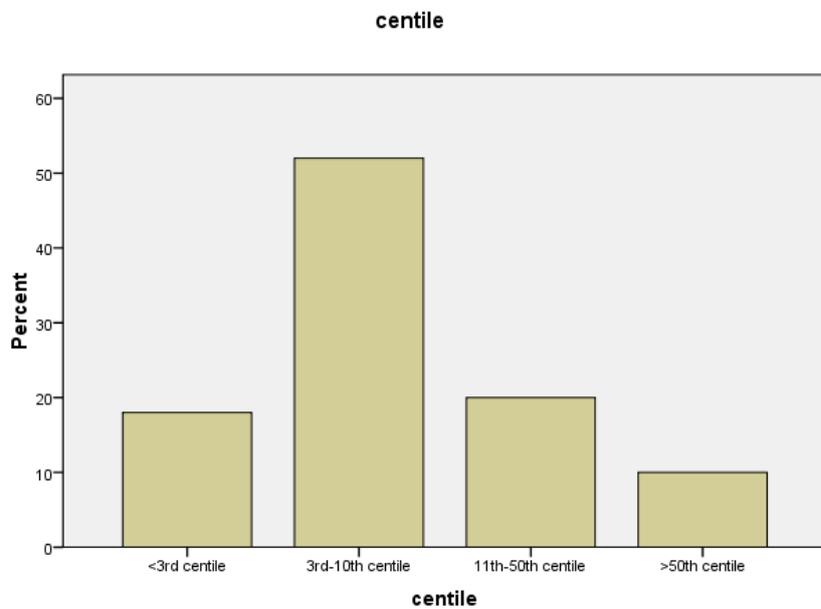


Figure (3): Shows the relation between body weight and I.D.A

Table (4): Shows the levels of S. Iron, Total iron binding capacity (T.I.B.C), S. ferritin in IDA cases.

Variable	Minimum	Maximum	Mean	Std.deviation
T.I.B.C	410	602	467.5	44.72
S.Iron	9	19	13.36	2.66
S.ferritin	4	9	6.70	1.41

Discussion:

In this study, the prevalence rate of anemia was (66%) in children between 6-24 months of age. This study showed that I.D.A. constitute (55.5%) of all cases of anemia.

The percentage of the illiterate mother among the cases was (39%), primary (43%) and secondary & high education (18%), then by comparing between the 2 group found that the P-value was significant $p=0.037$.

This study showed that the incidence of IDA is higher in our region than the average of (7%) in the developed EU countries⁽²⁰⁾, Sweden (19%)⁽²¹⁾ or Iceland (20%)⁽²²⁾. The reason might be that the iron is not regularly used for prevention of IDA in infants. In Danish infants aged 9 months, the prevalence of IDA was near to zero because of the direct program for prevention of IDA.⁽²³⁾

It is clear from the study that the peak age for IDA is between 6 to 12 months. This is due to depletion of iron stores during this period of life and iron content of cow's milk and breast feed was not sufficient to meet many infants' requirements and complementary foods were usually low in iron⁽¹⁸⁾. These results are similar to the studies done by Oski et al⁽²⁴⁾ and studies done by Omar Zidane in Childs central teaching hospital in baghdad.⁽²⁵⁾

In this study, there is no significant difference between males and females. These results are similar to the studies done by Omar Zidane⁽²⁵⁾ and in contrast to the study done by Monajemzadeh in

Ahwaz, Iran⁽²⁶⁾ that found that gender apparently plays an important role in infant's iron status and he found that boys had a tendency to have lower ferritin concentration than girls and the difference was statistically significant.

The other authors have reported a similar sex difference Male C, Persson LA et al study⁽²⁰⁾ and Domellof M, Lonnerdal B et al study.⁽²²⁾

In this work, rural cases have exceeded urban ones. This may be due to prolonged breast feeding, low education level of the mothers, neglecting of the babies and faulty feeding & insufficient diet rich in iron⁽¹⁹⁾ and this result is compatible to the study of Omar and against the results of Monajemzadeh⁽²⁹⁾ and results of Vendt et al.'s they showed that there was no relationship between IDA and those living in an urban or rural area.⁽²¹⁾

Also this result similar to the study done by Omar Z.⁽²⁵⁾ and disagree with results of Monajemzadeh⁽²⁶⁾. which showed that the educational level of the mother did not have an effect on the iron status of her infant.

In this study, the mean age of weaning was (5.12) month this means that early weaning from 6 month of age and substitution by iron deficient diet causing IDA. This agrees with Mallah 1996⁽²⁷⁾ and Monajemzadeh⁽²⁶⁾ There is also an agreement with Gellis & Kagan's et al.⁽²⁸⁾ who said that in infants less than 12 months inadequate iron intake with early weaning can lead to IDA.⁽²⁸⁾

In this study, there are no significant differences between types of feeding and IDA. These result against study done by Omar⁽²⁵⁾ which show that the IDA is more common in breast-feeding. Hutchinson said unduly prolonged milk feeding result in iron deficiency⁽²⁹⁾.

The timely introduction of iron-rich complementary food is especially important for breast-fed infants⁽³⁰⁾.

Seventy percent of our patients had their body weight below 10 centile. This

study is nearly in agreement with Mallah⁽²⁷⁾ and Omar⁽²⁵⁾. This low body weight is probably part of the general nutritional inadequacy. Jacob attributed the underweight feature in iron deficient patients to the associated anorexia, impaired small bowel function⁽³¹⁾. Preterm babies develop IDA more than full term because preterm start their life with reduced iron contents and having rapid growth rate⁽³¹⁾.

Conclusion:

1. Peak age of Iron deficiency anemia (I.D.A) is between 6-12 months of age and there is no sex deference.
2. Iron deficiency anemia is more common among rural children, probably because of low education of the mothers and feeding mismanagement.
3. The majority of infants with IDA were underweight.

Recommendations:

1. Iron supplementation better to be started before 4 months of age
2. Good antenatal care should be given to all pregnant women regarding iron therapy and iron rich diet to restore both the mother and baby' iron stores.
3. Encouragement of breast feeding.
4. Education of the parents through mass media and through primary health care. These educations should include early consultation when they notice that their babies have certain signs and symptoms such as pallor, pica, anorexia and mood changes.

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