Iron Deficiency Anemia among Children in Al-Semawa Teaching Hospital for Maternity and Childhood / Al-Muthanna Governorate/ Iraq

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Abstract

- *Background: Iron deficiency anemia (IDA) is a common type of anemia among children in Al-Muthanna Governorate.*
- *Objectives : The aim of this study is to defect the main causes of this disease and its impact on children and its responses to the treatment among the children in this city*
- *Methods: Thirty patients were involved in this study. We depended on the medical history and clinical examination in addition laboratory investigations when identifying their IDA status.*
- *Results: Thirty patients presented with IDA, 14 of them are males (46.6%), and the remaining 16 are females (53.4), their ages ranged between 6 months and 12 years, all patients suffered from pallor and lethargy, about 10 patients were younger than 5 years, and 12 patients' ranged between 5-<10 years old, the remaining 8 patients ranged between 10 – 12 years old.*
- *Conclusion: IDA is a common disease among children in the world especially in the developing countries like Iraq and the earlier the diagnosis and treatment the better the prognosis to avoid serious complications of this disease.*

Keywords: *Medical history and clinical examination in addition to laboratory investigation like complete blood count blood film for morphology and serum iron level .*

I. Introduction

Iron deficiency anemia (IDA) refers to a condition in which the hemoglobin content of the blood is lower than normal as a result of deficiency of the essential nutrients (mineral iron) regardless of the cause of such deficiency [1].

IDA is common before 5 years of age, preterm babies, malabsorption syndrome and in pregnant mothers .[2,3] The signs and symptoms of IDA include pallor , fatigue , delayed motor development ,cognitive disorder and school performance retardation [4,5,6].

There are advices by many international organizations for prevention of this disease including iron rich formulas and avoiding fresh cow milk in the first 12 months of life and treatment of patients properly [7]. Mineral iron is mostly transferred to the fetus during 3rd trimester of pregnancy, so preterm babies have low iron stores and at risk of IDA, so iron supplement is started at 3-8 weeks of age, blood transfusions are required in the first few months of life .[8,9]

Milk has a relatively low iron amount and absorption from breast milk is about 50%, whereas only 10% is absorbed from cow milk by the gastrointestinal tract, these are the main reasons making unmodified cow milk not suitable until twelve month of age.[8]

The best sources of iron include : breast milk , baby formula with iron , infant cereals and other fortified cereals in addition to eggs , chicken , red meat , fishes , spinach and apricots.[10,11,12] Iron supplementation improves appetite , learning , memory , cognitive and motor developmental functions among children.[11] (page:2)

Milk and antacids can interfere with iron absorption and should not be taken at the same time as iron supplements.[10] IDA most commonly affects children 9 -24 months , so diet rich in iron minerals should be given particularly during this period [11]. The common causes of IDA among younger children are prolonged breast feeding, fresh cow milk or unmodified cow milk intake in addition to parasitic infestations and pica.[11,11,12]

Infants and children need to absorb an average of 1mg of iron per day and most children need to receive 8-10 mg of iron per day because of only absorption of 10% of this intake and the breast feed babies need

less, because iron is absorbed 3 times better when it is in breast milk[10,11]. There is an association between IDA and seizures: "IDA as risk factor for simple febrile seizures".[13]

Oral elemental iron therapy is given in a dose of 6 mg /kgm of body weight per day in 2-3 divided doses for at least 2-3 months during which Hb becomes normal to replenish stores [14,15] . In response to iron therapy, there are improvement of intracellular iron enzymes and decreases irritability in addition to initial bone marrow response, erythroid hyperplasia and reticulocytosis and increases in Hb level and repletion of stores[16,17]. Parenteral iron jectofer is a safe and effective means to treat IDA in children who cannot receive or do not respond to oral iron due to intolerance and iron malabsorption[19].

II. Patients and Methods

Thirty patients were involved in this study having IDA attended Al-Semawa teaching Hospital for maternity and childhood. The diagnosis of IDA was based on medical history which includes ; the age , sex, address of patients in addition to the clinical findings like pallor , irritability , hypotonia , delayed motor development , glossitis , dysphagia ,koilonychia , decrease school performance and few cases presented with heart failure , in addition to laboratory investigations like Hb , total red blood cells count and its indices like (MCV , MCH, MCHC) which showed hypochromic , microcytic picture in addition to serum iron level .

All other causes of anemia like bleeding tendency and hemolytic anemia and lead poising were excluded. All cases were followed up and reevaluated by doing the above investigations and showed improvement. Descriptive statistics were used to assay P value for pre and post treatment values.

III. Results

Results of the present study are illustrated in the following tables:-

Table -1: Distribution of children according to age and sex :-

Age(years)	Sex				Total	
	Male		Female			
	No.	%	No.	%	No.	%
< 5	4	13.3	6	20.0	10	33.2
5 → < 10	5	16.7	7	23.3	12	40.0
10 → 12	5	16.7	3	10.0	8	26.8
Total	14	46.7	16	53.3	30	100

Note: (*Summary of Table 1*)

Age(years)	Sex	Total cases (30)
< 5	4 male 6 female	10(33.2%)
5 → < 10	5male 7female	12(40.0%)
10 → 12	5male 3female	8(26.8%)

Table-2: Mean of Hb Level, RBCs count and PCV in different groups of cases:

Age(years)	Hb (gm/dl)		RBC(million/mms		PCV %	
	Range	Mean	Range	Mean	Range	%
< 5	4.5-9.2	7.4	2.5-4.3	3.6	16-29	25.3
5 → < 10	7.8-9.6	8.6	3.8-4.3	4.1	27-31	29
10 → 12	6.5- 9.5	7.6	3.5-4.1	4	23-29	27.2

Table -3: Mean of RBC indices in different age groups cases

Age (years)	MCV(FL) Range	MCH(pgm) Range	MCHC (gm/dl) Range
< 5	58-68	14-18	23-28
5 → < 10	66-69	18-21	26-28
10 → 12	60-68	15-20	24-29

Table -4: Mean of serum iron level in different age groups of cases:

Age (years)	Serum iron level μgm/dl (microgram/deciliter) Range
< 5	24 → 28
5 → < 10	30 → 35
10 → 12	26 → 31

Table -5 :Shows the normal blood range of RBCs and mean corpuscular volume (MCV) (Taken from illustrated textbook of pediatrics , UK – London , Tom Lessauer , and Graham –Clayden , printed in 1997 – 1998 by Mosby international , page : 323.

Age	Hb(gm/dl)	MCV(FL)
< 5	11.5 → 15.5	7.5 → 87
5 → < 10	11.5 → 15.5	77 → 95
10 → 12		

Table -6: Shows normal serum iron level among children: Taken from illustrated textbook of pediatrics "same reference in table -5 "

Age (years)	Normal serum –iron level
Infant (< 1 year)	30.5 → 150.5 µgm/dl (microgram /dl) Or 5 → 25µ mote /L (micromoles/L)
Children 1 → 12 years	60 → 130 µgm /dl Or (10 → 30 mote /L)

Table -7: Sequences of events after iron therapy in iron deficiency anemia (Taken from department of pediatrics and physiology government medical college / Jamma (J & K) , India (2001) :

Time after iron administration	Development
12 → 24 hours	Replacement of intracellular iron enzymes , subjective improvement , decreased irritability and increased appetite
36 → 48 hours	Initial bon narrow response , erythroid hyperplasia
48 → 30 days	Increase in Hb level
1 → 3 month	Repletion of stores serum ferritin returns to normal

IV. Discussion

Thirty patients were involved in this study, 16 of them were females (53.4 %) while the remaining 14 were males (46.6%). From table 1, we found that the most group affected ranged between 5 → < 12 years and accounts for 12 cases.

Females were affected more than males at the ratio 1.14 , those with ages <5 years account for 10 cases (33.2%) , while the least affected age group ranged between 10 → 12 years and accounted for 8 cases (26.8%). Table 2 showed that Hb level was reduced in all cases when compared with the normal Hb level in table-5 , and reduced mainly in ages <5 years , and this is mostly due to prolonged breast feeding and unmodified cow milk intake , in addition to poverty , parasitic infestations and eating pica.[10,11,12] The differences were statistically significant, P value < 0.01**.** Also table 2 showed that the RBCs count and PCV are reduced mainly in the age group <5 years while moderately reduced in ages ranging between 10 → 12 years and mildly reduced in groups ranging between 5 → <10 years , the P value < 0.001 .

Table 3 showed that RBCs indices "hypochromic, microcytic picture "were reduced in all age groups and this correlated with other studies [18]. The degree of IDA as shown in table 2 and table 3 was severely affected in ages < 5 years , while moderately affected in the age group ranging between 10 → 12 years and mildly affected in the age group ranging between 5 → < 10 years.

Regarding to table 4, we noted that the mean serum iron level was reduced in all groups when compared with the normal values in table 6. This was mainly reduced in children below 5 years of age, differences were statistically significant, P value < 0.01.

In this study we found that the incidence of IDA was more in the city center of Al-Muthanna governorate if compared with other studies, as in Egypt which showed that this disease was common in rural areas[18], because of the low intake of iron rich foods and high incidence of parasitic infestations[10,11,12], in addition to frequent consumption of tea with foods which inhibits the absorption of iron by tannin which is present in tea [8].

In this study we also depended on the dramatic response of IDA patients to elemental iron therapy[14,15] by clinical improvement and result of laboratory data including Hb, Red blood cells count, PCV, Reticulocytes, Red blood cells indices including (MCV, MCH, MCHC) and serum iron level and stores[16] , when compared with sequences of events after iron therapy as shown in table 7.

V. Conclusion

Iron deficiency anemia is a common nutritional problem in the world especially in the developing countries like Iraq .The early the diagnosis and treatment of IDA cases the best prognosis. Assessment of growth and development and taking good medical and nutritional history and doing simple investigations including Hb, RBCs count, reticulocytes, MCV, MCH, MCHC and serum iron level are essential for early diagnosis and treatment of this disease among children in Al-Muthanna governorate to avoid its serious complications like hypotonia, irritability, poor appetite, dysphagia, headaches in addition to motor and cognitive disorders.

Antenatal care for all pregnant mothers regarding iron rich foods and early management of premature babies play an important role for reducing the incidence of this problem. From this study we also found that there is a correlation between iron deficiency and seizures.

The best treatment of IDA is oral elemental iron therapy in a dose of 6mg /kgm/day in 2-3 divided doses for 2 ⟶ 3 months or parenteral iron therapy (jectofer) which is safe and effective in cases of malabsorption syndrome and in cases with intolerance to oral therapy. Blood transfusions may be required in pregnant mothers and in severe premature babies with iron deficiency anemia.

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