STUDY OF IRON DEFICIENCY IN INFANTS BY MEASURING SERUM FERRETIN LEVELS

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Abstract

Introduction: In human body for many metabolic processes to take place as a mineral iron is necessary element. It is a part of haemoglobin which is important and essential for the delivery of oxygen to the cells of body. Worldwide especially in developing countries Nutritional anaemia is problem with the highest prevalence. When the hemoglobin and/or hematocrit are two standard deviations below the mean for that particular age and sex then a child is said to be anemic. This national problem of iron deficiency (ID) without anemia is worldwide concern which lead to long term neurodevelopment and behavior disorders that may be irreversible. Anaemia is consider as serious condition because it impair in behavioral and motor development, impairments in cognitive performance, coordination, language development, and scholastic achievement as well as increased morbidity from infectious diseases. This is most endangered in age group of 6- 24 months of age.

Aim: The main objective of this study is to prevalence of iron deficiency in infants by measuring serum ferretin levels.

Material and Method: Total 70 patients with various age groups from 1 month to 24 months of age group attending to Pediatrics department of this college were included for study. For each patient various physical examinations were carried out to rule out other causes of anaemia like hemolytic anaemia, anaemia of chronic disease etc. laboratory investigations like CBC, Hb indices and peripheral smear carried out. In all the patients Serum ferritin levels were estimated.

Result: Prevalence of anaemia (Hb<11gm/dl) in 1- 12 months age group was 82.3%, in 13- 18 months age group was 79.5% and in case of 19-24 months age group was 85.4%. Overall, 82.7% of infants were found to be anemic. Among the total anaemic patients 45 infants (64.3%) among 70 infants had mild anaemia, 19 infants (27.1%) had moderate anaemia, 6 infants (8.6%) had severe anaemia. 48 (68.6%) out of 70 patients had low serum ferritin levels and only 21(30%) had normal levels. Out of 70 patients 48 had low serum ferritin levels. However though not all infants having low MCV had iron deficiency but all iron deficient infants have low MCV value. 2 of 70 infants had serum ferritin level >400ng/ml.

Conclusion: In this study there is significantly Association between iron deficiency and low MCV. This study emphasis need for iron supplementation aim all healthy infants as early as 6 months. More and more studies on a larger population of children should be carried out to determine the role of other factors is needed.

Keywords: Infants, iron deficiency, serum ferretin, Haemoglobin level, MCV

Introduction

In human body for many metabolic processes to take place as a mineral iron is necessary element. It is a part of haemoglobin which is important and essential for the delivery of oxygen to the cells of body. Iron is component of many enzymes that necessary for wide range of metabolic processes such as neurotransmitter synthesis and function, phagocyte antimicrobial activity, production of DNA, collagen and bile acidsⁱ. The majority of iron utilized by body is acquiring from reutilization of iron released from erythrocyte catabolismⁱⁱ. Worldwide especially in developing countries Nutritional anaemia is problem with the highest prevalence. When the hemoglobin and/or hematocrit are two standard deviations below

the mean for that particular age and sex then a child is said to be anemicⁱⁱⁱ. In the world population about more that 30% of people are suffering from anaemia. Anaemia is common cofactor encountered in infants in both indoor as well as outdoor practice^{iv}. This national problem of iron deficiency (ID) without anemia is worldwide concern which lead to long term neurodevelopment and behavior disorders that may be irreversible^{v, vi, vii}. Serum ferritin test is classified as a confirmatory test which has great potential to be used as primary screening test for iron deficiency. When hematological estimation is not available or hemoglobin estimation is not feasible then recognition of severe anemia by clinical examination is one of the means of case finding. On the basis of a

history is best Selective screening to identify the risk factors that warrant a blood test for anemia have been recommended^{viii}. Anaemia is consider as serious condition because it impair in behavioral and motor development, impairments in cognitive performance, coordination, language development, and scholastic achievement as well as increased morbidity from infectious diseases. This is most endangered in age group of 6- 24 months of age^{ix, x}. Many studies reported in developing countries shows high prevalence of iron deficiency anaemia about 30-51%^{xi, xii}. The main objective of this study is to prevalence of iron deficiency in infants by measuring serum ferretin levels.

Material and Methods:

This is a cross sectional study which is conducted in the Department of Pediatrics of Prasad Institute of Medical Science, Sarai Shahzadi Banthara, Kanpur Road Lucknow . In this study total 70 infant patients were included. Total 70 patients with various age groups from 1 month to 24 months of age group attending to Pediatrics department of this college were included for study. Detail history of patients was taken as a form of recorded data from patient's parents or care taker. For each patient various physical examinations were carried out to rule out other causes of anaemia like hemolytic anaemia, anaemia of chronic disease etc. laboratory investigations like CBC, Hb indices and peripheral smear carried out. In all the patients Serum ferritin levels were estimated.

Result:

Total 70 infants' patients were included in this study during the period of one year from the age group 1month to 24 months were examined and investigated for iron deficiency and anaemia. The sex and age distribution of patients were shown in table 1 and 2 below. From the following data prevalence of anaemia (Hb<11gm/dl) in 1- 12 months age group was 82.3%, in 13- 18 months age group was 79.5% and in case of 19-24 months age group was 85.4%. Overall, 82.7% of infants were found to be anemic. Amont the total anaemic patients 45 infants (64.3%) among 70 infants had mild anaemia, 19 infants (27.1%) had moderate anaemia, 6 infants (8.6%) had severe anaemia. Routine follow up were done for all these patients and some of them did not have any symptoms including infants with moderate and severe anaemia.

Table 1: showing according to sex

Sex	no	%
Male	37	52.9
Female	33	47.1
Total	70	100.0

Table 2: showing anemia among different age group

Age group(in months)	no	%
0-4	3	4.3
5-9	18	25.7
10-14	34	48.6
15-19	10	14.3
20-24	5	7.1
Total	70	100.0

From all the patients serum ferritin levels were also done with its Haemoglobin level (mg/dl). From all the patients it shows that 48 (68.6%) out of 70 patients had low serum ferritin levels and only 21(30%) had normal levels. even in patients having mild anaemia has found Low levels as shown in table no 3 below.

Table 3: showing Hemoglobin level and serum ferritin level

Haemoglobin level (mg/dl)	S. Ferritin (ng/ml)			Total
	<12	12-400	>400	
>11	3	9	0	12
9-11	24	9	0	33
7-9	16	2	0	18
<7	5	1	1	7
Total	48	21	1	70

Serum ferritin levels were also done with MCV (Fl) from all patients. Among 70 patients 63 has low MCV level. Out of 70 patients 48 had low serum ferritin levels. However though not all infants having low MCV had iron deficiency but all iron deficient infants have low MCV value. 2 of 70 infants had serum ferritin level >400ng/ml. In this type of cases one should rule out other causes like acute infection, thalassemia syndromes and other hemolytic anaemia as shown in table no 4 below.

Table 4: showing MCV level and serum ferritin level

MCV (Fl)	S. Ferritin level (ng/ml)			Total
	<12	12-400	>400	
<80	48	15	0	63
80 - 95	0	5	1	6
>95	0	0	1	1
Total	48	20	2	70

DISCUSSION:

A studied of NFHS-3 survey shows 79.2% incidence of anaemia in children aged 6-35 months with 72.7% in urban areas and 81.2% in rural areas. Similar study was carried out by Kapur D et al which showed 9-36 months children aged with iron status in an urban slum integrated child development services project Delhi. Studied found that 64% children (9-36 months of age) were anemic; of those 7.8% had severe anaemia. 88% of children were iron deficient as determined by low serum ferritin levels^{xiii}, ^{xiv}. In India various studies showed only 45% of children at 6-8 months age receive adequate complementary foods. About 10% of breastfeeding children aged 6-35 months eat eggs, meat and fish which are rich in heme iron with high bioavailability^{xv}. Babiker et al^{xvi} studied showed similar report as this study. Studied carried out by Hajishabani et al^{xvii} shows the prevalence of anemia in healthy children (<5 years old) of Yazd reported as 20.8%. According to studied of Ghiasi et al^{xviii} studied reported a high prevalence of anemia (67.8%) among malnourished children less than 5 years old. NIPI (national iron plus initiative) has recommends iron supplementation in the form of IFA syrup containing 20mg/ml of concentrated iron and 1ml bi weekly along with feeding^{xix}. The guidelines of NIPI are not strictly followed in urban areas because of absence of ASHA/anganwadi workers. At 6 months of age Iron supplementation should be started and carried on up to 24 months^{xx}, ^{xxi}. In this study, hemoglobin concentration and MCV levels were correlated with underweight and S. Ferritin level so that it can be better markers for the assessment of anemia which is also found in the study of Ghosh et al^{xxii} reported serum ferritin can be used as sensitive marker for measurement of iron status in surveyed children.

CONCLUSION:

In children with Non-organic failure to thrive (NFTT) anemia and iron deficiency anemia were more frequent. In this study there is significantly Association between iron deficiency and low MCV. Therefore for the treatment of anemia early diagnosis is essential. This study emphasis need for iron supplementation aim all healthy infants as early as 6 months. More and more studies on a larger population of children should be carried out to determine the role of other factors is needed.

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