Research Paper Medical Sciences

A Study of Clinical Profile And Etiology of Severe Anemia in Children Aged 6 Months to 5 Years.

Nilesh B Chavhan MD (Paediatrics) postgraduate student, Department of paediatrics, Smt Kashibai Navale Medical College & General Hospital, Pune.

Sanjay A Natu MD (Paediatrics), Professor, Department of paediatrics, Smt Kashibai Navale Medical College & General Hospital, Pune.

ABSTRACT

Aims: This study aimed to determine the clinical profile and etiology of severe anemia among hospitalized children aged 6 months to 5 years.

Methods: A cross-sectional study was conducted between June and December 2015 in a tertiary care hospital. In this study total 38 children clinically anemic of either sex, of age 6 months to 5 years with hemoglobin level less than 7gm/dl were included from Paediatric ward and PICU of Smt. Kashibai Navale medical college and hospital, Pune.

Results: Iron deficiency was the most common cause of severe anemia (44.73%)

followed by anemia due to malaria (26.31%) and haemoglobinopathy (10.52%). On clinical examination pallor was present in all patients, hepatomegaly in (76.31%) and splenomegaly in (55.26%) patients.

Conclusion: Iron deficiency is the commonest cause of severe anemia in our area followed by severe malarial anemia

KEYWORDS : : Anemia, Hemoglobin, Iron deficiency, serum ferritin,

Introduction:
Anemia is defined as a clinical condition characterized by reduction in hemoglobin concentration of blood below the normal for age, sex physiological condition and altitude above sea level of that person[1]. It is a global problem mainly affecting poor people in developing countries[2].

Iron deficiency is believed to be the most important cause of anemia among children in India[3] and is attributable to poor nutritional iron intake and low iron bioavailability[4]. Other factors, including folate and vitamin B12 and A deficiencies, malaria, hookworm infestation, and hemoglobinopathies, are also associated with childhood anemia[5-7].

The overall prevalence of anemia was 27.1% (95% CI: 24.98, 29.14): 13.8% had mild, 10.8% moderate, and 2.3% severe anemia[8]. Studies on etiology of severe anemia in paediatric age group are very few. This study aimed to determine the clinical profile and etiology of severe anemia among hospitalized children aged 6 months to 5 years

Methods: The study was conducted in the Pediatric wards and the Pediatric Intensive care unit (PICU) of a tertiary care medical college hospital. The study period was 1st June 2015 to 31st December 2015. All children admitted to the pediatric ward or PICU, between 6 months to 5 years of age with severe anemia defined as hemoglobin concentration less than or equal to 7 g% were included in the study.

Exclusion criteria included- children with a prior diagnosed cause of anemia, prior history of blood transfusions, history of any surgical procedure in prior 3 months and children with active hemorrhage or any bleeding disorder.

A detailed history was taken from parents of each child including presenting complaints, past and family history of anemia, developmental history and dietary history using the 24 hour dietary recall method. History of prematurity / low birth weight, breast feeding, age of introduction of complementary feeding etc was also obtained. A thorough general and systemic examination including anthropometry were done for all patients. Each child's nutritional status was classified according to the WHO reference standard for malnutrition for under five years of age using the z score. Partcipants were classified as mild, moderate or severe malnutrition.

The baseline complete blood count was done using the Sysmex KX-21 automated hematology analyzer and leishmann stained peripheral blood smear was examined for morphological characteristics of red blood cells. Depending upon the clinical history and preliminary result of the peripheral smear, reticulocyte count and red blood cell indices, each child was evaluated to find the cause of anemia. Relevant tests like serum ferritin, serum Vit B12 levels, rapid test for malaria, high performance liquid chromatography, liver function test, kidney function tests etc were performed on venous sample. All children were also tested for HIV and HBsAg.

Severe anemia was defined as Hb <7 g/dl. Iron deficiency was defined as serum ferritin <12 µg/L. Vitamin B12 deficiency was defined as serum levels less than 203 pg/mL. Hemoglobinopathies were confirmed by HPLC

Results: Results of the study are shown in the tables

Table -1: Age distribution of patients:

Age	Number of patients	Percentage
< 1yr	8	21.05
1-3 yr	18	47.36
3-5 yr	12	31.57

Table-2: Gender of patients:

	Number of patients	Percentage
Male	18	47.3
Female	20	52.6

Table-3: Presenting Complaints:

Symptom	Number of patients	Percentage
Fever	23	60.5
Pallor	16	42.10
Anorexia	11	28.94
Swelling	10	26.31
Dyspnea	9	23.68
Cough	8	21
PICA	6	15.78
Fatigue	5	13.15
BHS	2	5.26
Miscellaneous	2	5.26
Icterus	1	2.63
Rash	1	2.63

Table-4: Developmental History:

Development	Number of patients	Percentage
Normal	29	76.31
Delayed	8	21.05
Regression	1	2.63

Table-5: Clinical signs on admission:

Clinical Sign	Number of patients	Percentage
Pallor	38	100
Hepatomegaly	29	76.31
Splenomegaly	21	55.26
Platynychia	14	36.84
Icterus	5	31.15
Edema	10	26.31
Signs of Vitamin Deficiency	5	13.15
Signs of CCF	3	7.89
Hemolytic facies	2	5.2
Lymphadenopathy	1	2.63

Table-6: Haemoglobin Level:

HB	Number of patients	Percentage
≤ 3	2	5.26
3 -5	13	34.21
5-7	23	60.52

Mean Hb : 5.44 g%

Table-7: Classification on basis of MCV:

MCV	Number of patients	Percentage
Microcytic	26	68.42
Normocytic	9	23.68
Macrocytic	3	7.89

Table-8: Peripheral blood smear picture:

	Number of patients	Percentage
Hemolysis	5	13.15
Hypersegmented Neutrophils	2	5.26
Malaria parasite	9	23.68
Microcytic /Hypochromic	19	50

Table-9: Serum Ferritin level:

Sr Ferritin	Number of patients	Percentage
Low	18	47.36
High	2	5.26
Normal	18	47.36

Table-10: Hb Electrophoresis report:

Hb Electrophoresis pattern	Number of patients
Hb-ss	01
Hb-D	01
Thalassemia major pattern	02

Table-11: Clinical Diagnosis:

Clinical Diagnosis	Number of patients	Percentage
Iron Deficiency Anemia	17	44.73
Malaria	10	26.31
Haemoglobinopathy	4	10.52
B 12 Deficiency Anemia	3	7.89
Iron + B12 Deficiency Anemia	1	2.63
Chronic renal failure	1	2.63
Celiac Disease	1	2.63
Chronic liver disease	1	2.63

Results: In the period of the study, 38 children qualified to be included in the study. 5 children with severe anemia admitted during this period were excluded because of prior diagnosed hemoglobinopathy (n=2), history for prior blood transfusions (n=1) and history of prior surgery (n=2). There were 18 males and 20 females. Majority of the patients with severe anemia were aged between 1-3 years. Fever and pallor were the commonest presenting complaints seen in around 60% and 42% of the study population. Developmental delay was present in almost one fifth of the children with severe anemia. 50% of the patients in the study group were underweight and 44.7 % were stunted. 18.5% of the severely anemic patients were classified as SAM and 23.6% as MAM as per WHO.

On clinical examination pallor was present in all patients followed by hepatomegaly in 76.31% and splenomegaly in 55.26% patients. The mean hemoglobin level of the group was 5.44 g%. About 40% of the study population had a hemoglobin less than 5 g%. On peripheral blood smear microcytic RBCs were seen in 68% patients.

In this study, iron deficiency was the most common cause of severe anemia (44.73%) followed by anemia due to malaria (26.31%), haemoglobinopathy (10.5%) and Vitamin B12 deficiency (7.89%).

Discussion:

The present study was undertaken due to a lack of substantial literature on severe anemia in the community as well as in the children admitted to the hospitals. Anemia is a very common accompaniment of patients admitted for various reasons to the hospital. The presence of severe anemia may alter the presentation of many conditions as well as affect the management decisions in certain settings.

The results of this study are consistent with the concept that the sole use of hemoglobin values should not be used to treat severe anemic children with haematinics. They must be investigated to find out the cause and type of anemia before starting treatment. In the present study, though iron deficiency anemia was the most common etiology of severe anemia, more than half the subjects had anemia due to reasons other than iron deficiency. Prevalence of severe anemia caused due to iron deficiency was similar in both genders. Folate and vitamin B12 deficiency had a small contribution, independent of iron deficiency, in causing severe anemia, a finding similar to that reported by De la Cruz-Góngora V et al[9]. Another study showed that stunted children were more susceptible to anemia[10-11]. Bernard S. et al found the prevalence of mild, moderate and severe anaemia in the sample of malnourished children was 32.4%, 22.2% and 0.7% respectively[11]. Malnutrition and anemia are still major public health problems that contribute to child morbidity and mortality, they should be addressed with an effective intervention[12].

In India, over 95% of children are breastfed[13] . The WHO recommends introducing solid and semisolid food at the age of six months because breastfeeding does not suffice to maintain optimal growth after this age. However, at age 6–8 months only 45% of children receiving breastfeeding are given solid or semisolid food[13-14]. Moreover, only 10% of breastfeeding children and 20% of nonbreastfeeding children aged 6–35 months eat meat, fish, or eggs , which are rich in haem iron with high bioavailability[15-16] . In the NFHS-3, only 14.6% of children aged 6–35 months consumed food rich in iron in the previous 24 hours of the survey [13]. At this age, the effect of iron deficiency on the neurological development cannot be totally reversible[17-18]. Consequently, the Indian Government recommends iron and folic acid supplementations to younger children[19]. However, the programme implementation has been poor due to lack of logistic planning and accountability[19].

In this study, second most common cause of severe anemia was malaria. Malaria contributes to reduce hemoglobin concentrations through a number of mechanisms, principally by destruction and removal of parasitized red cells and the shortening of the life span of non-parasitized red cells, and decreasing the rate of erythrocyte production in the bone marrow. Some of the mechanisms that cause anemia during malaria are associated more with the acute clinical states (e.g. hemolysis or cytokine disturbances)[20] . Mortality rates from severe malarial anemia can exceed 30% in pediatric populations[21]. We found hemoglobinopathy was the third most common cause of severe anemia in present study. Most prevalent hemoglobinopathy was thalassemia major pattern.

Conclusion: The findings of our study support the need for a broad public-health strategy for the control of anemia among Indian children beyond delivering iron supplementation alone. Our findings suggest that current public-health strategies such as iron supplementation are necessary but not sufficient to reduce childhood anemia.

Reference:

1. Viteri Fe. A new concept in the control of iron deficiency: community based preventive supplementation of at risk groups by weekly intake of iron supplements. Biomed Enviro Sci 1998;11(1): 46-60
2. Cook JD. Iron deficiency anemia. Baillieres Clin haematology 1994;7: 787-804.
3. World Health Organization. Iron Deficiency Anaemia: Assessment, Prevention, and Control—A Guide for Programme Managers. Geneva, Switzerland: World Health Organization; 2001. Available at: www.who. int/nutrition/publications/micronutrients/ anaemia_iron_deficiency/WHO_NHD_01.3/en/ index.html. Accesses April 20, 2015
4. Thankachan P, Walczyk T, Muthayya S, et al. Iron absorption in young Indian women: the interaction of iron status with the influence of tea and ascorbic acid. Am J Clin Nutr.2008;87(4):881– 886
5. Duque X, Flores-Hernandez S, Flores-Huerta S, et al. Prevalence of anemia and deficiency of iron, folic acid, and zinc in children younger than 2 years of age who use the health services provided by the Mexican Social Security Institute. BMC Public Health. 2007;7:345
6. Calis JC, Phiri KS, Faragher EB, et al. Severe anemia in Malawian children. N Engl J Med. 2008;358(9):888–899
7. Schneider JM, Fujii ML, Lamp CL, et al. Anemia, iron deficiency, and iron deficiency anemia in 12–36-mo-old children from low income families. Am J Clin Nutr. 2005;82(6): 1269 –1275
8. Mesfin F, Berhane Y, Worku A . Anemia among Primary School Children in Eastern Ethiopia. PLoS ONE 10(4): e0123615. doi:10.1371/journal.pone.0123615
9. De la Cruz-Góngora V, Villalpando S, Rebollar R, Shamah-Levy T, Méndez-Gómez I. Nutritional causes of anemia in Mexican children under 5 years. Results from the 2006 National Health and Nutrition Survey. Salud Publica Mex 2012;54:108-115.
10. Radi S, El-Sayed N, Nofal L, Abdeen Z. Ongoing deterioration of the nutritional status of Palestinian preschool children in Gaza under the Israeli siege. EMHJ. 2013;19(3):234–41.
11 . Bernard S. Prevalence and Risk Factors of Anemia among Children 6–59 Months Old in Haiti. Anemia. 2013;2013:502968.
12. Kishawi RR, Soo KL, Abed YA ,Manan WA. Anemia among children aged 2–5 years in the Gaza Strip- Palestinian: a cross sectional study. BMC Public Health (2015) 15:319
13. Arnold F, Parasuraman S, Arokiasamy P, Kothari M, "Nutrition in India," in National Family Health Survey (NFHS-3) India 2005-06.
14. Chantry CJ, Howard C.R, Auinger P, "Full breastfeeding duration and risk for iron deficiency in U.S. infants," Breastfeeding Medicine.2007; 2(2): 63–73.
15. Zimmermann MB, N. Chaouki N, Hurrell RF, "Iron deficiency due to consumption of a habitual diet low in bioavailable iron: a longitudinal cohort study in Moroccan children," The American Journal of Clinical Nutrition.2005; 81(1): 115–121, 2005.
16. Hurrell R, "How to ensure adequate iron absorption from iron-fortified food," Nutrition Reviews.2002; 60(7): S7–S15.
17. Baker RD, Greer FR, and Committee on Nutrition American Academy of Pediatrics, "Diagnosis and prevention of iron deficiency and iron-deficiency anemia in infants and young children (0–3 years of age)," Pediatrics.2010;126: 1040–1050.
18. More S, Shivkumar VB, Gangane N, Shende S, "Effects of iron deficiency on cognitive function in school going adolescent females in rural area of central India," Anemia, vol. 2013, Article ID 819136, 5 pages, 2013.
19. Kotecha PV, "Nutritional anemia in young children with focus on Asia and India," Indian Journal of Community Medicine.2011; 36(1):8–16.
20. McDevitt MA, Xie J, Gordeuk V, Bucala R. The anemia of malaria infection: role of inflammatory cytokines. Curr Hematol Rep. 2004;3:97–106.
21. Perkins DJ, Were T, Davenport GC, Kempaiah P, Hittner JB, Ong'echa JM. Severe Malarial Anemia: Innate Immunity and Pathogenesis. int J Biol Sci. 2011; 7(9): 1427–1442.