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Original Research Article

Clinico-Etiological Profile of Anemia in Children Aged 6 Months to 60 Months Admitted in A Tertiary Care Centre

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Abstract:

Background: Anemia is a significant global health issue, particularly in developing nations. This issue is easily treatable and largely prevented. The prevalence rate in India is about 51%. According to the NFHS 2005–2006, at least 80% of Indian children between the ages of 12 and 23 are anemic. The majority of children with anemia have abnormal Hb or hematocrit levels on routine screenings and are asymptomatic. Lower scores on tests of mental and motor development and behavioral and cognitive deficits are all linked to anemia in infancy and the early years of childhood. The objectives of this study are to identify the clinical, etiological, and risk variables for severe anemia.

Methods: From May 2022 to October 2022, this study was carried out at Department of Pediatrics, SKMCH, Muzaffarpur, Bihar. Patients with severe anemia (Hb <7 gm/dl) in the age range of 6 months to 60 months were selected as subjects.

Results: Out of 50 patients, 25 (50%) had iron deficiency anemia, and 8 (16%) had megaloblastic anemia. The mean hemoglobin was 5.22, with a standard deviation of 1.389 and a range of 2 to 7 gm/dl. The mean MCV was 76, while the MCH and MCHC values were 20 and 26, respectively.

Conclusion: Anemia was prevalent among children admitted to SKMCH. Caregiver unemployment and hunger were factors that were highly linked to severe anemia. The two most prevalent kinds were megaloblastic anemia and iron deficiency anemia.

Keywords: Hematocrit, iron deficiency anemia, megaloblastic anemia, hemoglobin.

Introduction

One of the greatest worldwide health issues is anemia, particularly in emerging nations like India. Despite being entirely avoidable and easily curable, the condition is highly common in young children, pregnant women, and nursing mothers.[1] A third of the world's population, or approximately 30%, has anemia because of a variety of factors.[2–4] According to estimates from the World Health Organization (WHO), anemia affects [1].

62 billion people worldwide, with pre-schoolers having the highest frequency (47.4%). According to the fourth National Family Health Survey (NFHS) 2015–2016, 58.6% of children aged 6–59 months had anemia, with rural areas being more afflicted than urban areas.[5] According to estimates, the prevalence of anemia among high-risk Indian populations may range from 50% to 80%, with 10% to 20% of those having moderate to severe anemia.[6] Low family income, low maternal education, no access to healthcare, unsanitary living conditions, and inadequate iron intake in the diet are the risk factors for anemia that are most frequently mentioned in the literature.[7,8] Low socioeconomic position, consuming cow's milk prior to 6 months of age, low birth weight, and prematurity all carried additional risks for newborns.

Nutritional anemia is the most prevalent kind of anemia in impoverished countries. Iron deficiency is the most frequent cause of nutritional anemia, but other causes include a lack of folic acid, a lack of vitamin B12, or a combination of these. Hemolytic anemia, which can be acquired or congenital, is among the other varieties. Haemoglobin abnormalities, enzyme flaws, and membrane defects are examples of congenital causes, whereas acquired causes can be immune or non-immune. Other kinds of anemia include aplastic anemia, blood loss anemia, and chronic illness anemia.[9,10]

Global cause-specific analyses typically concentrate on a single country or region, the iron shortage, or both.[11–14]

This study was designed to investigate the relevant socioeconomic, demographic risk factors and the etiology of severe anemia in Indian children aged 6 to 60 months using statistical modeling. This was done in light of the severity and repercussions of severe anemia.

Material and Methods

From May 2022 to October 2022, this observational cross-sectional study was carried out in the Department of Pediatrics, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

Our study's subjects were patients with severe anemia (Hb <7 gm/dl) according to WHO criteria who were admitted to the pediatric unit and were between the ages of 6 and 60 months.[15] Fifty children were chosen as the appropriate sample size for the investigation.

A sequential sampling was conducted among the hospitalized kids. The parents of the enrolled youngsters gave their informed consent. Exclusion criteria for the trial were children with Hb>7 gm/dl, age <6 or >60 months, lack of parental consent, history of recent surgery or blood transfusion, and children with recognized causes of anemia or active bleeding.

2 mL of venous blood was taken under aseptic conditions and immediately submitted to the lab for hematological testing in a vacutainer that contained ethylene diamine tetra acetate (EDTA). The following parameters were assessed using the Automated Blood Cell Counter (MS-9-3-S), Digital Photochlorimeter/Hemoglobinometer hematology analyzer: Hematocrit (PCV), RBC count, Total leucocyte count (TLC), Differential leucocyte count (DLC), and Platelet Count (PC). Leishman's stain was applied to slides in order to investigate their morphology and check for malarial parasites.

Utilizing the bright cresyl blue dye, reticulocytes were counted. Because there are no nearby essential organs and the posterior superior iliac crest contains predominantly cellular marrow, it is the best location for bone marrow aspiration in children. In children younger than 18 months of age, the anterior medial surface of the tibia was chosen. High Performance Liquid Chromatography (HPLC) was used to make the diagnosis of hemoglobinopathies and thalassemias. The direct Chemiluminescence technology approach was used to conduct additional research into serum ferritin levels, Vitamin B12 levels, folic acid levels, and Total Iron Binding Capacity (TIBC).

MCV's reference range was set at 80 to 100 fl, MCH's at 27 to 32 pg, and MCHC's at 32 to 36 g/dl. When MCV value was less than 80fl and MCH was less than 27, microcytic anemia was diagnosed. When MCV was larger than 100fl, macrocytic. As soon as all hematological indices fell within the normal range, a normocytic normochromic sample was obtained.

Data was gathered in accordance with the performa, loaded into an Excel spreadsheet, and the proper statistical techniques were used to provide the desired results.

Results

Table 1: Baseline clinical profile of children with severe anemia (n=50)

Variables	Groups	Number	Percentage
Sex	• Male	20	40.0%
	• Female	30	60.0%
Age	• <2 years	18	36.0%
	• >2 years	32	64.0%
Delivery status	• Preterm	15	30.0%
	• Term	35	70.0%
Exclusive breastfeeding till 6 months	• Yes	32	64.0%
	• No	18	36.0%
Adequate complementary feeding after 6 months	• Yes	10	20.0%
	• No	40	80.0%
Maternal Anemia	• Present	18	36.0%
	• Absent	32	64.0%
Socioeconomic status (As per IAP Kuppuswami scale)	• Upper middle	18	36.0%
	• Lower middle	25	50.0%
	• Upper lower	7	14.0%
	• Lower	0	0
Education of parents	• Primary	11	22.0%
	• Secondary	33	66.0%
	• College	5	10.0%
Nutritional status (As per IAP classification)	• No malnutrition	1	2.0%

	• Grade 1 malnutrition	11	22.0%
	• Grade 2 malnutrition	27	54.0%
	• Grade 3 malnutrition	11	22.0%
	• Grade 4 malnutrition	1	2.0%
Clinical Examination	• Pallor	50	100.0%
	• Icterus	5	10.0%
	• Hepatosplenomegaly	2	4.0%
	• Lymphadenopathy	2	4.0%

50 children's records were eventually examined (Table 1). In our study, there was a little female preponderance (n=30; 60%).

The age range for presentations [mean 29.4±13.8] was 6 months to 60 months. 15 children were born early (premature, or <37 weeks gestation). 32 infants were exclusively breastfed for the first six months of life, but only 10 got adequate supplemental food in accordance with infant and early child nutrition guidelines. Anemia in the mother affected 18 of the children.

According to the modified Kuppuswami scale, there were no patients in the higher and lower socioeconomic level, but there were 18 children who belonged to the upper middle class, 25 to the lower middle class, and 7 to the upper lower class. 11 children were classified as having grade 1 malnutrition, 27 had grade 2, 11 had grade 3, and 1 had grade 4 malnutrition, according to the Indian Academy of Pediatrics (IAP) categorization system.

Upon clinical examination, all of the children were noticeably pale, and 2 had hepatosplenomegaly, 5 had icterus, and 2 had lymphadenopathy.

Hemoglobin: The mean value was (5.219±1.40) g/dl, the maximum value was 7 g/dl, and the minimum value was 2 g/dl. 12% of the patients had hemoglobin levels of 3g/dl, 24% had levels of 3-4.9g/dl, and 64% had levels of 5-7g/dl.

RBC Indices: The mean MCV, MCH, and MCHC were (76.88±31.92) fL, (20.87±7.41) pg/dL, and (26.15±3.91) g/dl, respectively, among 50 patients with anemia in children (6-60 months).

Table 2: Classification on the basis of RBC morphology

Morphology	Number of patients	Percentage
Normocytic normochromic anemia	9	18.0%
Microcytic hypochromic anemia	21	42.0%
Macrocytic anemia	11	22.0%
Dimorphic anemia	9	18.0%

Microcytic hypochromic anemia is the most prevalent morphological kind of anemia, followed by macrocytic (11), dimorphic (9), and normocytic normochromic (9) anemias (Table 2). Severe anemia's most frequent cause (n=41) was nutritional anemia. In cases of nutritional anemia, 25 children were iron deficient, 8 were vitamin B12 deficient, 6 were vitamin B12 and folic acid deficient, and 2 were folic acid deficient solely. Thalassemia (4), inherited spherocytosis (1), cancer (1), malaria (1), aplastic anemia (1), and bleeding diathesis (1) were other causes of anemia (Table 3).

Table 3: Etiology of severe anemia in children

Etiology	No. of patients	Percentage
Iron deficiency anemia	25	50.0%
Megaloblastic anemia (Vitamin B_{12} deficiency)	8	16.0%
Combined megaloblastic anemia (Vitamin B12 and Folic acid defiency)	6	12.0%
Thalassemia	4	8.0%
Megaloblastic anemia (Folic acid deficiency)	2	4.0%
Hereditary spherocytosis	1	2.0%
Malignancy	1	2.0%
Malaria	1	2.0%
Aplastic anemia	1	2.0%
Bleeding diathesis	1	2.0%
Total	50	

Discussion

Due to a dearth of research on the causes of and risk factors for severe anemia in hospitalized children, the current study was conducted in order to develop preventive strategies for a high-risk population. Anemia is frequently present in patients who are admitted to the hospital for a variety of causes, and the presence of severe anemia can

change how many conditions present as well as how some conditions are managed.

The findings of this study highlight the importance of diet in preventing severe anemia, with 80% of patients having anemia brought on by nutritional deficiencies. But because only half of the patients in our study were determined to be iron deficient, the study also advises against treating severely anemic youngsters solely based on hemoglobin values with hematinic.

Before beginning treatment, more research must be done to determine the nature and etiology of the anemia. Similar to other research, iron deficiency was found to be the most common cause of severe anemia, but around half of the patients also had anemia from other sources.

In addition to iron deficiency, we discovered high frequency of anemia caused by folic acid and vitamin B12 deficits. In contrast to prior research, 16 out of 50 individuals had a folic acid or vitamin B12 deficiency, or both. Compared to national data, we found that the prevalence of exclusive breastfeeding was high in our study.

While 64% of the children in our study were exclusively breastfed, the NFHS- 4 states that only 54.9% of infants under 6 months are solely breastfed. As 80% of the children in our study did not receive appropriate complementary feeding in accordance with baby and young child feeding practices, our study further showed the significance of adequate complementary feeding for the prevention of severe anemia.

Conclusion

The practice of starting iron and folic acid therapy on the assumption that a patient has an iron deficiency should be discouraged. Additionally, there is no need to transfuse blood in all severely anemic children (who are not experiencing congestive heart failure) without first performing bone marrow tests. To completely eradicate the root cause of anemia in children under the age of five in our nation, extensive community-based trials and highly effective interventional programs will be required in the future.

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