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Research Article

Study On Peadiatric Anemia In Out Patient Department At A Tertiary Care Centre, Rajkot, Gujarat, India

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ABSTRACT

Background: Anemia is one of the most common hematological abnormalities found in newborns and children. It leads to increased morbidity and mortality, neurological complications, risk of low birth weight, infection, and heart failure. Pediatricanemia is one of the major health problems in India and in many parts of the world, as it results in reduced exercise tolerance, slower rate of growth, impaired development and cognition, and delayed wound healing. Anemic children are also at a higher risk of death due to complications associated with malnutrition and infection.

Aims and Objectives: To evaluate the clinical features and the basic hematological parameters of anemia in infants and children, in the age group of 6 months to 14 years. To study the morphological patterns of different types of anemia on peripheral smear & correlate with corresponding clinical presentation.

Materials and Methods: A prospective study was conducted among the pediatric patients who attended the pediatric clinic between August 2024 to July 2025. Their blood samples were collected in Out Patient Department Laboratory (OPD), Pathology, PDU Medical College and Hospital, Rajkot, Gujarat, India. 2 Millilitre(ml) of venous blood was collected in EthyleneDiaminetetraAcetic acid EDTA vials from pediatric patients who attended pediatric clinic. The blood was subjected to complete haemogram and peripheral blood smear and evaluated.

Result: Total 3000 pediatric samples were received out of which 1640(54.67%) were having anemia. Out of which 953(58.11%) were male patients and 687(41.89%) were female patients. Most commonly affected age group of pediatric patients is 6 months to 2 years, total 455 cases(27.74%). According to blood indices and peripheral smear examinations hypochromic microcytic anemia (975 cases) (59.45%) was the most commonest type of anemia seen in pediatric population.

Conclusion: Hypochromic microcytic anemia was found to be the most common cause of anemia in pediatric patients this study. Identifiction of etiologies of anemia can be helpful in defining diagnostic and therapeutic strategies, which contributes toward the better management of patients.

Keywords: *Anemia, children, Hypochromic microcytic anemia.*

INTRODUCTION

Anemia is characterized by decreased number of circulating red blood cells or functionally as a condition where numbers of erythrocytes are not sufficient to meet metabolic demands. According to WHO roughly a quarter of the world's population suffers from anemia, including almost half of preschool-age children. Iron deficiency anemia being the most common cause of anemia worldwide, other causes are hemoglobinopathies, infection, and chronic diseases. The increasing availability of genetic testing is providing new mechanistic insights into inherited anemia and allowing diagnosis in many previously undiagnosed cases.

Pediatric anemia is one of the major health burden in India and in major parts of the world, as it results in reduced exercise tolerance, slower rate of growth, impaired development and delayed wound healing [1]. Anemic children are also at a higher risk of death due to complications associated with malnutrition and infection. Prevalence rate of anemia is an essential indicator of the nutritional status within the pediatric population. In the United States, around 18% of the children and in the developing countries about 82% of the children are anemic [2] Because of these factors, the study of theetiopathogenesis of anemia in infancy and childhood has attracted wide attention in therecent years in India [3,4].

In most children, anemia is asymptomatic buthas abnormal hemoglobin levels on routine screening. A child with anemia would not always have pallor or all other related symptoms, so acquiring a complete history and carry out a proper physical examination can help in identifying the cause of anemia [2]. The iron stores are easily restored during the first fewmonths of life even when the hemoglobin levels tend to fall. Thus iron deficiency is very rare to induce anemia until the reach of six months.

MATERIALS AND METHODS

The present study was carried out in the OPD Laboratory, Department of Pathology, P.D.U Medical College and Hospital, Rajkot, Gujarat, India over a period of 1 year between August 2024 to July 2025 which is a tertiary care hospital in western India**.** Total 3000 pediatric samples were received out of which 1640(54.67%) were having anemia.The detailed history, clinical and physical examination and hematological investigations were performed. Blood counts were performed on a 5part BC-6200 - Automated Hematology cell counter which was followed by peripheral smear examination. Differential count and red cell morphology were done manually by staining the blood smears with Field's and Leishman's stain.

RESULTS

Total number of pediatric samples were 3000 (100%) out of which 1640(54.67%) were having anemia.
Out of these patients, 953(58.11%) were males and 687 (41.89%) were females, having male: female ratio of 1.4:1.

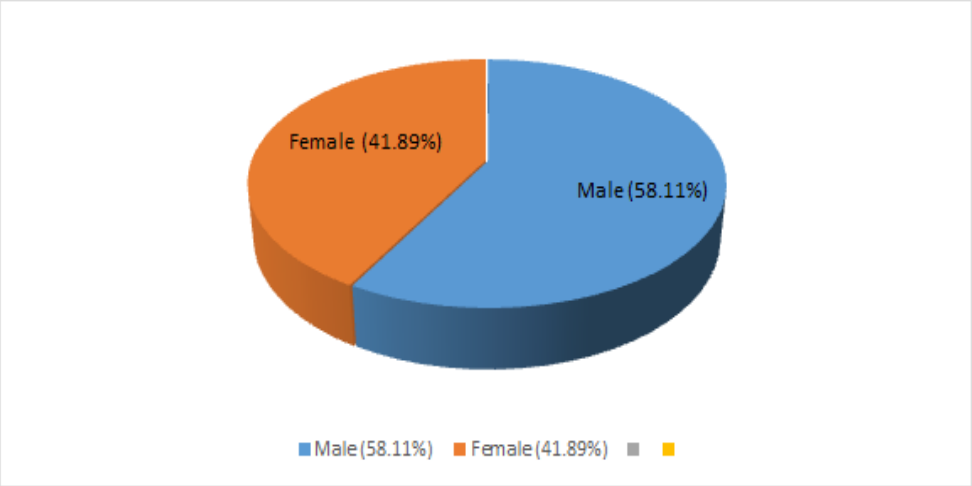

Figure 1: Showing sex wise distribution of pediatric anemia cases.

Table 1: The hemoglobin cut-off for anemia as recommended by WHO according to child age.

Child age	Mild anemia	Moderate anemia	Severe anemia
Children 6 months to 5 years of age	10-10.9gm/dl	7-9.9gm/dl	<7gm/dl
Children 5-11 years of age	<11-11.4gm/dl	8-10.9gm/dl	<8gm/dl
Children 12-14 years of age	<11-11.9gm/dl	8-10.9gm/dl	<8gm/dl
15 years of age and above	<11-11.9gm/dl	8-10.9gm/dl	<8gm/dl

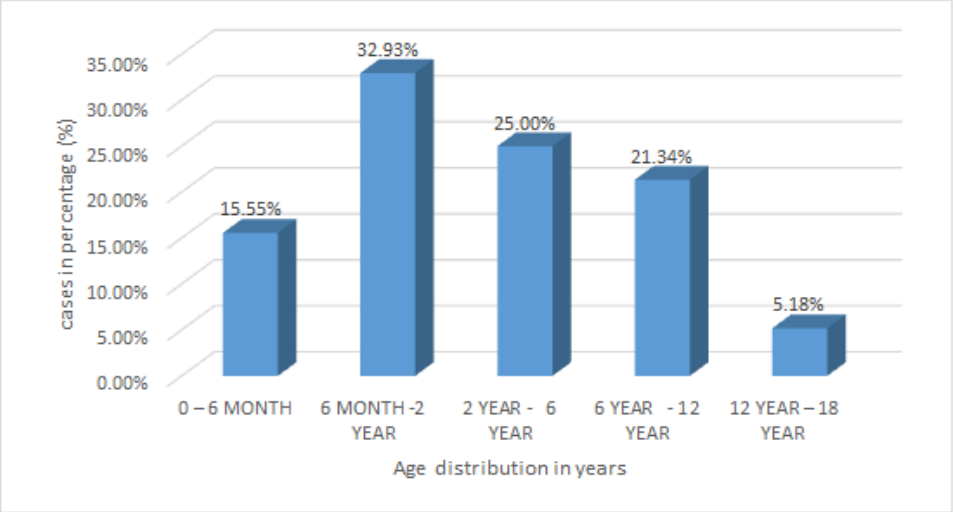

Figure 2: Showing age wise distribution of pediatric anemia.

Out of total 1640 pediatric patients most common affected age group was 6 months to 2 years in 540 (32.93 %) anemic patients followed by age group 2-6 years 410 patients (25 %), 6 year – 12 year 350 patients (21.34%), 0-6 month 255 patients (15.55%), 12 – 15 year 85 patients (5.18%).

Table 2: Red cell morphology on peripheral blood smear of anemia

RBC Morphology on Peripheral Blood Smear	Number of Patients	Percentage (%)
Normocytic Normochromic anemia	**525**	**32.01%**
Microcytic Hypochromic anemia	**975**	**59.45%**
Macrocytic anemia	**48**	**02.93%**
Dimorphic anemia	**69**	**04.21%**
Haemolytic anemia	**23**	**01.40%**
Total case of anemia	**1640**	**100%**

Out of total 1640 pediatric patients peripheral blood smear analysis hypochromic microcytic anemia 975(59.45 %) was the most common morphological type of anemia followed by normochromic normocytic anemia 525 (32.01 %), dimorphic anemia 69(4.21 %), macrocytic anemia 48(2.93%), haemolytic anemia 23 (1.40%).

There were total 975(100%) patients of hypochromic microcytic anemia. Out of those 810 (83.07 %) patient's serum ferritin level was less than 15, total iron binding capacity >300 and transferrin saturation level was less than 10 which is suggesting of iron deficiency anemia. 165(16.93%) patient's serum ferritin level > 15, total iron binding capacity < 360 and transferrin saturation level >10 which is suggesting of anemia due to chronic disease.

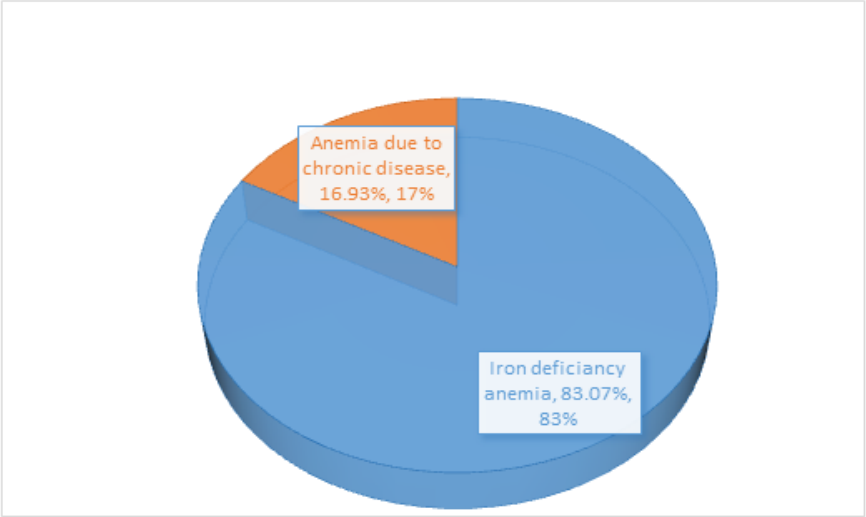

Figure 3 :Prevalance of iron deficiency anemia.

In the current study, the common presenting symptoms were gastrointestinal including vomiting, diarrhea and pain abdomen followed by fever, respiratory symptoms and failure to thrive. Jaundice, skin rashes, urinary complaints, CNS manifestations, ear discharge and facial puffiness were seen in a few cases.

In this study, pallor was found in all the cases. The common signs included signs of dehydration, hepatosplenomegaly, fever, short stature, tachypnoea/ tachycardia and frontal bossing. Flag sign, jaundice, pedal edema, hemiperesis/ hemiplegia, dry skin, muscle wasting, In this study, gastrointestinal diseases were most commonly associated with anemia, followed by respiratory diseases, nutritional disorders, CNS diseases and infectious diseases. microcephaly and cervical lymphadenopathy were seen in some cases.

Micronutrient deficiencies were constructed as binary variables following sex- and age-specific WHO cutoffs (Benoist, [7]; Namaste et al., [6]; WHO, [8,9]): iron deficiency as ferritin < 15 ng/ml. Iron-deficiency anaemia (IDA) is a common clinical problem throughout the world and an enormous public health problem in developing countries. The cornerstone of the laboratory identification of IDA is a low haemoglobin and serum ferritin concentration although a normal serum ferritin does exclude IDA. When the serum ferritin is normal in an anaemic patient with iron-deficient erythropoiesis, it is common practise to perform a bone marrow examination to diagnose IDA.

The recent introduction of serum transferrin receptor measurements is a useful alternative for distinguishing IDA from the anaemia of chronic disease because the serum receptor concentration is usually elevated in patients with IDA but normal in patients with anaemia due to inflammation or neoplasia. It is helpful for the clinician to be aware of the causes of physiological IDA.

HPLC (High performance liquid chromatography) was done for further work up of haemolytic anemia. Out of 23 (100 %) patients 12 (52.18%) were of thalassemia, 8 (34.78%) patients were of sickle cell anemia and 3 (13.04 %) patients were of auto immune hemolyticanemia. (Figure 4)

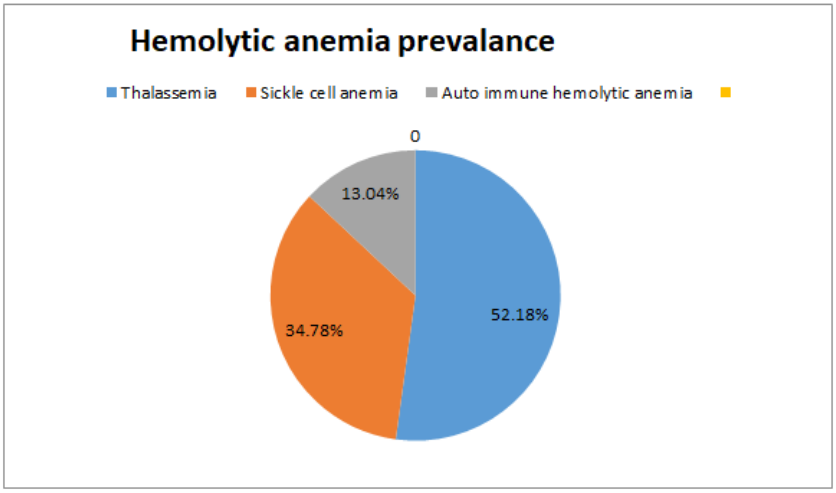

Figure 4: Hemolytic anemia prevalance

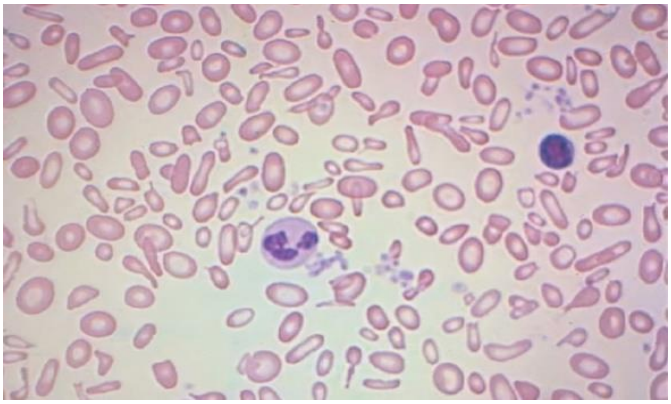

Figure 5: Peripheral blood smear showing Microcytic Hypochromic Anemia.

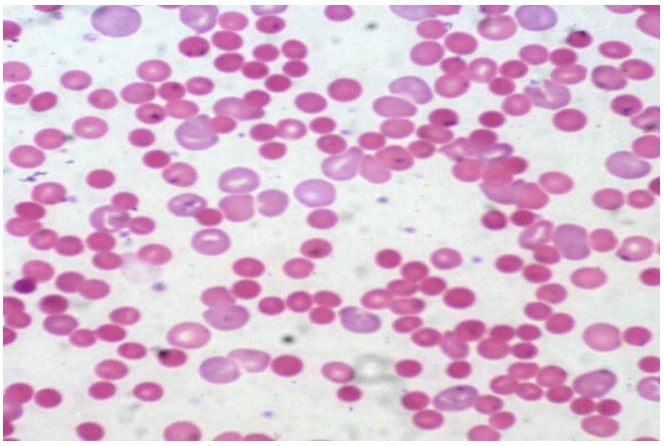

Figure 6: Peripheral blood smear showing haemolytic anemia.Morphologically characterized by Reticulocytes, Polychromatic, polychromatophilic red blood cell.

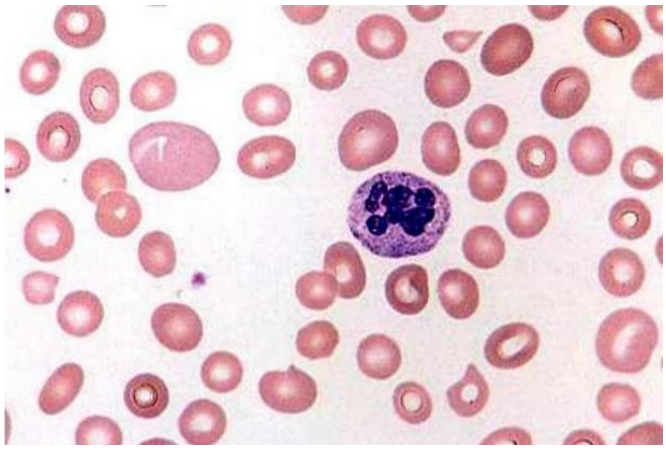

Figure 7: Peripheral blood smear showing macrocytic anemia with hyper segmented neutrophils with macro-ovalocyte.

DISCUSSION

Pediatric anemia is a crucial universal problem. It is a critical issue which has to be addressed on a priority basis especially in the developing countries. Nutritional anemia is a recognized public health problem worldwide. Anemia is the most common nutritional problem in India, affecting more than half of the total population, particularly the children and the pregnant women. Given the detrimental effects of iron deficiency anemia, its prevention in childhood is an important public health issue.

Prevalence of anemia in our study was 54.67% which is decreased than the with study conducted by Venkatesh G [1] at Ahmedabad in which prevalence was 81.2% respectively, and slightly higher than the study of Shally Awasthi et al [2] found prevalence of 37 to 38 % in studies done in Uttar Pradesh, Bijan Keikhaei [3] found prevalence of 43.9% among children of South West Iran which is in accordance with the present study. Peter R Dallman[4] found prevalence of 6%in United States of America.

Figure 1 shows that out of 1640 patients, 687 were female and 953 were male. So the ratio of male:female patients in the present study is 1.4:1, which is not in accordance with the study conducted by Gomber et al, in which "out of 95 children studied for etiology of anemia, 51 were boys and 44 were girls."There was no difference in sex distribution in the study conducted by Kapoor et al. In our study male predominance was found, similar results were found in some studies but female predominance reported by other studies and in one study no difference was found in anemia prevalence between genders.

Prevalence of anemia according to different age group in our study show prevalence of anemia is highest in the age group between 1 to 2 years which is 33% and it is highest as compared to other age groups in accordance with studies of Shally Avasthi et al [2] and Bijan keikhaei [3].

The most common reason behind this is continued breast feeding beyond 6 month and improper complimentary feeding which leads to deficiency of iron because breast milk is deficient in iron. Improper complimentary feeding techniques lead to various types of infection and malnutrition.

Hypochromic microcytic anemia is the most common type of anemia followed by dimorphic, macroovalocytic, and hemolytic which is in accordance with previous studies like Shally Awasthi[2] and Venkatesh G [1] .

CONCLUSION

In the current study, children between 1 to 2 years of age are found to be the most affected. Hence, it is recommended that, this age group is compulsorily screened for anemia. A uniform definition of screening criteria and an effective system to respond to abnormalities is the need of the hour. The current study was taken up, keeping this need in view. It can be prevented by improving awareness in people about serious manifestations of anemia in children including effect on growth and development with emphasis on its association with malnutrition so micronutrient supplementation in diet adequately provided to children. Second preventable cause is hemolytic anemia (thalesemia and sickle cell anemia) requires social awareness for premarital and prenatal counseling and screening in first trimester of pregnancy for timely decision.

REFRENCES

1. Venkatesh G, Soubhagya Talawar, Bela H Shah.Clinical Profile of Anemia in Children IOSR Journal of Dental and Medical Sciences 2013; 5:65- 69.
2. Shally Awasthi, Rohini Das, Tuhina Verma, Sheila Vir. Anemia and Undernutrition Among Preschool Children in Uttar Pradesh,India. Indian Pediatrics 2003; 40:985-990
3. Bijan Keikhaei, Khodamorad Zandian, Ali Gasemi, Ramin Tabibi. Iron deficiency anemia among children in southwest iran.Food and Nutrition Bulletin 2007; vol 28, n0.4:406-411.The United Nations University.
4. Peter R Dallman, Ray Yip,Clifford Johnson. Prevalence and causes of anemia in United states1976 to 1980.the American journal of Clinical Nutrition 1984; 39:437-445.
5. Neeraj Jain, Vibha Mangal Jain.Prevalence of anemia in school children. Medical Practice and Review Feb 2012; vol.3(1):pp 1-4.
6. Patel, S., Dhuppar, P., & Bhattar, A. (2017). Nutritional anemia status in adolescent girls in rural schools of Raipur, India. Medicinal Chemistry, 7, 4.
7. Mohanty, D. , Mukherjee, M. B. , Colah, R. B. , Wadia, M. , Ghosh, K. , Chottray, G. P. , Jain, D. , Italia, Y. , Ashokan, K. , Kaul, R. , Shukla, D. K. , & Muthuswamy, V. (2008). Iron deficiency anaemia in sickle cell disorders in India. The Indian Journal of Medical Research, 127, 366–369.
8. WHO. (2011a). Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity
9. WHO. (2011b). Serum ferritin concentrations for the assessment of iron status and iron deficiency in populations.