ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at:www.ijmacr.com

Volume – 8, Issue – 4, July - 2025, Page No.: 188 – 192

An Insight Into Anemia In Children

[1]Dr. Anjana Mohan, Junior Resident, Department of Pathology, Sri Siddhartha Medical College, Affiliated to Siddhartha Academy of Higher Education Tumkur, Karnataka

[2]Dr. Geetha J.P., Professor and HOD, Department of Pathology, Sri Siddhartha Medical College, Affiliated to Siddhartha Academy of Higher Education Tumkur, Karnataka

Corresponding Author: Dr. Anjana Mohan, Junior Resident, Department of Pathology, Sri Siddhartha Medical College, Affiliated to Siddhartha Academy of Higher Education Tumkur, Karnataka

How to citation this article: Dr. Anjana Mohan, Dr. Geetha J.P., "An Insight Into Anemia In Children", IJMACR- July - 2025, Volume – 8, Issue - 4, P. No. 188 – 192.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Introduction

Anemia in children is a major public health problem throughout the world. Anemia in children has been defined as the mean haemoglobin concentration present below the established cutoff levels that generally varies based on the age of the patient. Anemia in children should never be trivilazed.[1]

The diagnostic criteria set by WHO for diagnosing anemia is an Hb levels of <11gm% in children of age group of 6-59 months, <11.5 gm% in children in the age group of 5-11 years and 12gm% in older children aged 13-15years. [2]

Anemia is often multifactorial, iron deficiency being the most frequent etiology. Smaller proportion suffered due to micronutrients deficiencies (folate, vitamin B12) also. Anemia in children less than 5 years negatively impact the mental development and future social performance of these patients.[3]

Chronic anemia may impair growth, cardiac function and cognitive development in infants but other consequence are rather poorly described [4]

The present study is conducted to have an insight in to anemia in children by simple hematological parameters so that early recognition can prevent proper physical and cognitive development of the child.

Aim

- To assess the morphological types and causes of anemia in children.

Objectives

- To assess the RBC parameters in children with anemia.
- To assess the peripheral smear findings in anemia in comparison with CBC parameters.
- To assess the cause of anemia wherever further investigations are available.

Materials and Methods

- This is a cross sectional study undertaken in the Department of Pathology from January 2023 to June 2023.

Inclusion criteria

- All the patients with age range of 1 to 15 years with anemia are considered for the study.

Exclusion criteria

Patients suffering from serious infections, chronic infections and those who received blood transfusion in past 8 weeks or on haematinics in past 4 weeks were excluded from the present study.5ml of venous blood was taken in a dry disposable syringe and needle under all aseptic conditions by venipuncture in ante cubital vein in dry acid washed area for CBC in EDTA vacutainers. RBC parameters like Hb, HCT, MCV, MCH, MCHC, RDW and were analysed along with peripheral smear. Children having mean Hb levels below the cutoff of 11 gm% were further processed for biochemical investigation. Other investigations reports were collected to find out the cause of anemia.

Results

This study included 140 children with anemia. There were 45.5% of children in the age group of 1-5 years, 21.2%in the age group of 6-10 years and 37%in the age group of 11- 15 years. Out of this 66.6% were boys and 33.3% were girls.

Table 1: Table depicting the range and mean of CBC indices

	Range	Mean
Mean Hb levels	7.7 - 11	9.8
MCV	55 –101	73
MCH	20.9 – 34.5	25.4
MCHC	23.2-37.8	33.7
RDW CV	8-21	13

Table 2: Classification of Anemia According to Hb Level

Children	Mild anemia (10-10.9g/dl)	Moderate anemia (7-9.9 g/dl)	Severe (<7 g/dl)
1-5years	14	18	07
6-10 years	13	38	04
11-15 years	09	31	06
Total children (n=140)	36	87	17

Moderate grade of anemia was the most common grade of anemia in this study (62.1%). It is seen in 87 cases followed by mild anemia and severe anemia

Table 3: Classification of Anemia According to CBC Parameters

	Hb(g/dl)	MCV (fl)	MCH(pg)	MCHC (gm/dl)	RDW CV(%)
Mild anemia	10	68	23	30	18
Moderate anemia	8.6	65.7	20.8	30	21
Severe anemia	6.7	54	21	29	24

Severe anemia has high RDW CV compared to mild and moderate anemia

Table 4: Morphological classification of anemia

Type	Percentage
Microcytic Hypochromic	65.6%
Normocytic Hypochromic	20.5%
Dimorphic	9.4%
Macrocytic	4.5%

In our study majority of cases are microcytic hypochromic anemia (65.6%) followed by Normocytic hypochromic anemia (20.5%).

Table 5: Comparison of morphological classification of anemia with RBC indices

	Hb (g/dl)	MCV (fl)	MCH (pg)	MCHC (g/dl)	RDW CV (%)
Microcytic Hypochromic	8.6	65.7	20.8	30	21
Dimorphic	10	95	34.5	32	12.5
Normocytic Hypochromic	11	81	26	32	13
Macrocytic	10	101	35.6	32.8	14

Microcytic hypochromic anemia shows low Hb, MCV, MCH and MCHC with increased RDW CV. In dimorphic and normocytic hypochromic except Hb all other parameters are normal. In macrocytic MCV and MCH is increased with low Hb. Iron profile was available in 45% of cases where serum iron (<60mcg/dl) and ferritin levels (<12mcg/L) were low.

In 60% of microcytic hypochromic anemia cases, the iron profile revealed low iron levels, indicating iron deficiency.

Other cases with microcytic hypochromic were looked for hemolytic features of which 3 cases were further advised for hemoglobin electrophoresis in which two were found to be beta thalassemia and one was sickle thalassemia.

Serum Vit B12 assay was done in 50% of dimorphic and macrocytic anemia cases where serum vit B12 levels (<229pmol/l) were low.

Table 6: Comparison of morphological classification of anemia with other studies

	Present study	Kanchana et al[7]	Ramayana sastry etal[6]	Manohar Reddy et al[8]
Microcytic hypochromic	65.6%	37%	81.8%	67.4%
Dimorphic	9.4%	18%	9.09%	2.3%
Normocytic	20.5%	45%	9.09%	30.2%

Our study shows majority of cases were microcytic hypochromic followed by normocytic normochromic anemia. Manohar Reddy et al also shows similar findings. Our study also had Macrocytic cases of 4.5% which was not seen in other studies.

Microcytosis and hypochromia is the commonest findings of anemia in children which is a similar observation in other studies Subramanian DN et al [9]and Gedfie S et al[10]. The high prevalence of iron deficiency anemia in our study signifies the importance of screening in all children. Both Iron and B12 deficiency was seen in few dimorphic cases. Macrocytic and few dimorphic anemia cases showed B12 deficiency, which is attributed to nutritional deficiency.

Table 7: Comparison of mean of CBC indices with other studies

	Present study	Manohar Reddy et al[8]	Shweta et al [11]
Mean HB	9.8	8.6	8.5
MCV	73	76	72
MCH	25.4	21.3	23.8
MCHC	33.7	32.5	31.7
RDW CV	13	11.5	10.7

The mean CBC indices of our study is in concordance with Manohar Reddy et al and Shweta et al studies. Moderate grade of anemia was the most common grade of anemia in this study (62.1%) which is similar to Maiti et al study (73.3%) study .[12]

The marked variance in anemia is multifactorial, it is attributed to a number of factors like, children who were sick and brought health care for some other complaints, high parasitic burden and socio environmental factors.

Chronic diseases exert their effect through interference with hematologic balance between RBC productions via erythropoietin release, consequently inducing anemia.

One suggested protocol would be to take a dietary history and offer appropriate dietary advice to the parents of all patients with microcytosis where there is no immediate explanation and to add a RDW as it is increased in iron deficiency anemia and blood film analysis to any CBC samples as dimorphic anemia can be diagnosed only by peripheral smear study.

The CBC when combined with peripheral smear gave an indirect clue to the cause of anemia .It can be used in the low source settings. Haematology labs must strictly report results for patients under 16 against standardized, age-specific reference intervals**,** not adult ones.

Discussion

Anemia is an important health concern worldwide. Anemia in children under 5 years particular relevance because of effect of these parameters on physical, mental and social development.[1] Also the physical work capacity and immunity is negatively affected by iron deficiency anemia.

The term ‘nutritional anemia’ refers to a condition where blood hemoglobin concentration falls below normal levels due to deficiencies in essential nutrients. The primary nutrients involved are iron, folic acid (vit B9) and vitamin B12.Among these, iron deficiency is the most prevalent cause of nutritional anemia globally. Folic acid deficiency is less common and often occurs alongside of iron deficiency, while vitamin B12 deficiency is relatively rare.[6]

Conclusion

Our study demonstrates that simple hematological parameters in combination with peripheral smear study can cornerstone the cause of anaemia.

Early detection and Early interventions can be done to prevent anemia specially in children.

References

1. Uppal N, Sharma A, Kukreja S. A study of prevalence of anemia in pediatric population in a tertiary care hospital in Amritsar. Int J Clin Biochem Res 2019;6(3):396-400.
2. Moscheo C, Licciardello M, Samperi P, La Spina M, Di Cataldo A, Russo G. New Insights intoIron Deficiency Anemia in Children: A Practical Review. Metabolites. 2022 Mar 25;12(4):289

3. Camaschella C. New insights into iron deficiency and iron deficiency anemia. Blood Rev. 2017 Jul;31(4):225-233.
4. Joo EY, Kim KY, Kim DH, Lee JE, Kim SK. Iron deficiency anemia in infants and toddlers. Blood Res. 2016 Dec;51(4):268-273.
5. Simbauranga RH, Kamugisha E, Hokororo A, Kidenya BR, Makani J. Prevalence and factors associated with severe anaemia amongst under-five children hospitalized at Bugando Medical Centre, Mwanza, Tanzania. BMC Hematol. 2015 Oct 12;15:13.
6. Ramayana Sastry C.P.V.Study on clinical and hematological profile of anemia in childrenaged 5 to 12 years in rural Telangana .J Pediatric Res.2017;4&07):488-493
7. Kanchana, Madhusudhan Sr, Ahuja S, Nagaraj N. Prevalence and risk factors of anemia in under five year old children in childrens hospital. Int J Contemp Pediatric 2018;5:499-502
8. C. Manohar Reddy, Sai Geeta C.Evaluation of Anemia in Hospitalised infants at a tertiary care hospital .Int J MedRes Prof.2017Sept;3(5):208-10
9. Subramanian DN, Kitson S, Bhaniani A. Microcytosis and possible early iron deficiency in paediatric inpatients: a retrospective audit. BMC Pediatr. 2009 May 29;9:36.
10. Gedfie S, Getawa S,Melku M. Prevalence and Associated Factors of Iron deficiency and Iron Deficiency Anemia among under 5 children: A Systematic Review and Meta -Analysis .GlobPediatr Health.2022 Jul 6;9:2333794
11. J.H.S,Ashoka A,ShashikalaP.,A study of patterns of anemia in hospitalized infants at a tertiary care hospital.Indian J Pathol Oncol 2017;4(2)260-262.
12. Maiti D,AcharyaS,BasuS.Recognizing missed oppurtunities to diagnose and treat iron deficiency anemia: A study based on prevalence of anemia among children in a teaching hospital.J Family Med Prim Care 2019;8:899-903