ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 6, Issue – 2, March – 2021 , Page No. : 218 - 222

To study the morphological spectrum of anemias in pediatric age group

[1]Dr Parveen Verma, Post graduate student, Department of Pathology, Jhalawar Medical College, Jhalawar.

[2]Dr Rishi Diwan, Senior Professor Department of Pathology, Jhalawar Medical College, Jhalawar.

[3]Dr Yogendra Madan, Assistant Professor, Department of Pathology, Jhalawar Medical College, Jhalawar.

Corresponding Author: Dr Parveen Verma, Post graduate student, Department of Pathology, Jhalawar Medical College, Jhalawar.

Citation this Article: Dr Parveen Verma, Dr Rishi Diwan, Dr Yogendra Madan, "To study the morphological spectrum of anemias in pediatric age group", IJMSIR- March - 2021, Vol – 6, Issue - 2, P. No. 218 – 222.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Anemia is universal health issue, particularly in emerging nations like India. The etiology of anemia is multifactorial but iron deficiency anemia is considered to be the most common cause of anemia in developing nations like India. The aim of present study was to know the spectrum of anemia in pediatric age group using different haematological and biochemical investigations.

Methods: After obtaining approval and clearance from the institutional ethical committee, only those patients meeting the inclusion and exclusion criteria were included in this prospective study. Total 324 patients were enrolled for this study over a period of one y,ear (September 2019 - November 2020) at Jhalawar medical college & hospital.

Results: Out of the 324 cases, morphologically anemia was detected using PBF examination and found microcytic hypochromic anemia (45.37%) followed by dimorphic anemia (22.53%), normocytic normochromic (16.98%), macrocytic anemia (10.80%) and hemolytic anemia (4.32%).

Conclusion: Haematological tests can be used for early detection of anemia. Preventive programme for control of anemia in children should be made accompanied by measures of providing appropriate nutritional requirements

Keywords: Microcytic, Anemia, Haematological

Introduction

Anemia is a condition in which the number of red blood cells (and subsequently oxygen-carrying capacity) is insufficient to meet the body's physiologic needs. Specific physiologic needs of one's individual vary with the age, gender, residential height above sea level (altitude), smoking habits and various phases of pregnancy[1]

During childhood total body iron demand increases in proportion to body weight. After 6 months, growth slows and the diet becomes varied. Inspite of adequate iron diet, laboratory parameters of serum iron and TF saturation remain statically low[2]

At pubertal age, the secondary growth phase increases iron requirements to allow for the increase in red cell and muscle mass. This demand for more iron is particularly high in boys whose increment in lean body

mass is on average double that seen in girls. In girls, as the growth spurt ends , menstruation starts and there is a complusive need for extra iron to compensate for menstrual blood loss. Pregnancy can further aggravates the iron intake requirement of fertile females[3].

Dietary factors also play important role in developing Iron deficiency in early childhood. Human breast milk has been found to have low total content of iron. Alike heme iron ,the iron present in breast milk is highly bioavailable and able to increase the amount of iron absorbed from other food sources in the early weaning diet[4]

Materials And Methods

After obtaining approval and clearance from the institutional ethical committee, only those patients meeting the inclusion and exclusion criteria were included in this prospective study. Total 324 patients were enrolled for this study over a period of one year (September 2019 - November 2020) at Jhalawar medical college & hospital.

Anemia was morphologically typed and comparison was done with CBC Analyzer typing.

Reticulocyte count was done on each and every patient further correlated its value with morphological typing of anemias in patient.

Inclusion Criteria

Patients of pediatric age group 1-12 yrs. coming to as IPD patients showing anemia (low Hb as per age criteria of WHO) on automated 5-part analyzer (Sysmex XN1000).

Exclusion Criteria

History of recent blood transfusion (within 3 months).

Uncooperative subjects.

This hospital based study is approved by Ethical committee, Jhalawar Medical College.

Sample Size Calculation

The two formulae were considered for sample size calculation for the present diagnostic efficacy study. 1. Utilizing sensitivity and other 2. Utilizing specificity

n based on sensitivity $=Z^2_{1-\alpha/2}$ X S_N X $(1-S_N)$/ L^2 X Prevalence

n based on specificity $=Z_{1-\alpha/2}$ X S_N X $(1-S_P)/L^2$ X (1-Prevalence)

Where,

n= required sample size,

S_n = anticipated sensitivity,

S_p = anticipated specificity,

α = size of the critical region (1-α is the confidence level),

$Z^{1-\alpha/2}$ = standard normal deviate corresponding to the specified size of the critical region (α),

L = absolute precision desired on either side (half-width of the confidence interval) of sensitivity or specificity.

Taking sensitivity and specificity values Power: 95% and expected maximum prevalence as 50%, L= absolute precision as 10% and Confidence interval: 95% and Coefficient of variation (CV%): 17.5, from the above formula, sample size was found to be = 295. Considering the unknown error of 10%, the sample size for the present study needs to be increased to n=324.

Sampling Technique Followed

Every consecutive patient fulfilling inclusion and exclusion criteria was enrolled to complete the above calculated minimum sample size (n=324).

Results

Table 1: Distribution of cases gender wise in each age group.

Age (yrs)	Gender				Total	
	Male		Female			
	N	%	N	%	N	%
1-<2	93	61.18	59	38.82	152	46.91
2-<6	42	60.87	27	39.13	69	21.30
6-12	48	46.60	55	53.40	103	31.79
Total	183	56.48	141	43.52	324	100.00

Mean age of overall children to be affected by anemia came out to 4.38 years and mean age of male and female children group came as 3.77 years and 5.16 years respectively.

In 6-12 yr age group females(53.40%) were in high proportion as compared to males (46.60%).whereas in both 1-< 2 and 2-<6 yr age group ,males were more anemic as compared to female children. This data reveal that anemia is more prevalent age up to 5 years of children in present study.

Table 2: Morphological spectrum of anemias using PBF examination overall in this study

PBF typing	No. of patients	Percentage
Dimorphic Anemia (DMA)	73	22.53
HemolyticAnemia (HA)	14	4.32
Macrocytic Anemia (MA)	35	10.80
Microcytic hypochromic Anemia (MHA)	147	45.37
Normocytic normochromic Anemia (NCNC)	55	16.98
Total	324	100.00

Out of the 324 cases, morphologically anemia was detected using PBF examination and found microcytic hypochromic anemia (45.37%) followed by dimorphic anemia (22.53%), normocytic normochromic (16.98%), macrocytic anemia (10.80%) and hemolytic anemia (4.32%).

Table 3: Concordance of each anemia specific between PBF examination and RBC indices-based CBC analyzer typing.

PBF typing	Total	CBC Analyzer typing				P value
		Detected		Missed		
		Number of cases	Percentage	Number of cases	Percentage	
DMA	73	63	86.30	10	13.70	<0.0001
HA	14	6	42.86	8	57.14	0.592
MA	35	28	80.00	7	20.00	0.0003
MHA	147	137	93.20	10	6.80	<0.0001
NCNC	55	42	76.36	13	23.64	<0.0001
Total	324	276	85.19	48	14.81	-

Detection of anemia by analyzer typing as compared to PBF examination was maximum sensitive in microcytic hypochromic anemia (93.20%) followed by dimorphic anemia (86.30%), macrocytic (80%), normocytic normochromic (76.36%) and hemolytic anemia (42.86%).

Cases missed by analyzer typing were maximum in hemolytic anemia (57.14%) followed by normocytic normochromic (23.64%), macrocytic anemia (20%), dimorphic anemia (13.70%) and least in microcytic hypochromic anemia (6.80%).

Table 4: Clinical features and Physical examination finding in overall patients and gender wise presentation of anemia.

Clinical features	Gender				Total	
	Male		Female			
	N	%	N	%	N	%
Pallor	181	98.91	140	99.29	321	99.07
Jaundice	25	13.66	18	12.77	43	13.27
Hepatomegaly	74	40.44	52	36.88	126	38.89
Splenomegaly	46	25.14	34	24.11	80	24.69
Edema	14	7.65	12	8.51	26	8.02
SAM	13	7.10	14	9.93	27	8.33
HF	7	3.83	4	2.84	11	3.40
LNP	3	1.64	3	2.13	6	1.85

In both male and female children, pallor is the commonest clinical feature found with 99.07% association followed by hepatomegaly (38.89%), splenomegaly (24.69%), jaundice (13.27%) , severe acute malnutrition (3.40%), edema (8.02%) ,hemolytic facies (3.40%) and lymphadenopathy(1.80%) – least commonly associated.

Discussion

Out of the 324 cases, morphologically anemia was detected using PBF examination and found microcytic hypochromic anemia (45.37%) followed by dimorphic anemia (22.53%), normocytic normochromic (16.98%), macrocytic anemia (10.80%) and hemolytic anemia (4.32%).

Sastry C.P.V[5] in his study found that peripheral smear examination showed Microcytichypochromic anemia in 81.8% (90/110). Dimorphic anemia was seen in 9.09 %. Normocytic Normochromic anemia was seen in 9.09 % of patients. Venkatesh G [6]observed Microcytic hypochromic anemia in 54.4%, macrocytic hypochromic anemia is seen in 11.8% and dimorphic anemia is seen in36.6% of patients[7]

Commonest clinical feature associated was pallor (86.5%) followed by generalized weakness (85%),fever (61.7%), protein energy malnutrition (42.5%),developmental delay/weakness (20.7%) , pica (14%), koilonychia/nail changes (9.2%), seizure (8.25%), hepatomegaly (2%) ,splenomegaly (1.5%) and facial edema (1%).Whereas in my study pallor was commonest clinical association (99.07%) followed by hepatomegaly (38.89%) , splenomegaly (24.69%) ,jaundice (13.27%) , severe acute malnutrition (8.33%), facial edema (8.02%), hemolytic facies (3.40%) and lymphadenopathy (1.85%).

Sunil Gomber et al (1998)[8] studied 29 patients of 3 months to 12 yrs which were detected macrocytic

anemia on PBF examination. These had pallor (100%) in all cases, followed by Hepatomegaly (66%), Protein energy malnutrition (48%), splenomegaly (21%), bleeding manifestations (17.2%), focal seizures (6.8%) and infantile tremor syndrome (6.8%). In my study pallor (99.05%) is seen in almost all cases followed by hepatomegaly (34.48%), splenomegaly (20.68%), severe acute malnutrition and jaundice (17.24%), facial edema (13.79%) and lymphadenopathy (3.44%)

Conclusion

Haematological tests can be used for early detection of anemia. Preventive programme for control of anemia in children should be made accompanied by measures of providing appropriate nutritional requirements.

References

1. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. WHO/NMH/NHD/MNM/11.1.
2. Dr.Tejindar Singh's Atlas and Text of hematology, 2018, fourth edition
3. Barbara J Bain, David M Clark, Bridge S Wilkins, Bone marrow pathology,2019, 5th edition.
4. Robert J Arceci , Ian M. Hann , Owen P. Smith, Pediatric Hematology, 3RD Edition.
5. RamanaSastry C.P.V. Study on clinical and hematological profile of Anemia in children aged 5 to 12 years in rural Telangana. J Pediatr Res 2017;4(07):488-493
6. Venkatesh G, Soubhagya T, Bela H Shah. Clinical Profile of Anemia in Children. IOSR Journal of Dental and Medical Sciences 2013;10(5):65-69.
7. Gupte S: PediatricHematology . In Gupte S. The Short Textbook of Pediatrics. 10th edn. New Delhi; Jaypee. 2004:454-62
8. Sunil Gomber et al, Kusum Kela ,Neelam Dhingra ,Clinico-Hematological Profile of Megaloblastic Anemia, IJP,1998;35

Legend Figures

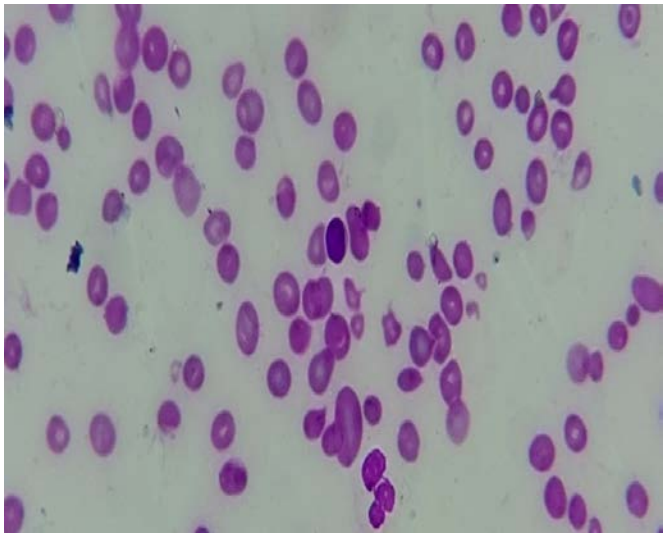

Figure 1: Macrocytic anemia and hypersegmented Neutrophil (100x , Leishman stain)

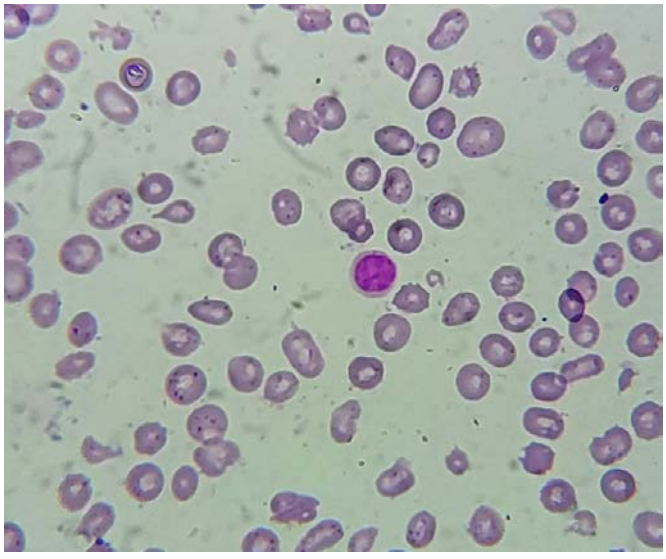

Figure 2: Dimorphic anemia (100x,Leishman stain)