A cross sectional analysis of anemia in pediatric population in a tertiary care Hospital, Rajkot

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Abstract

Background: Anemia is a wide spread public health problem in India which affects mainly children. In a country like India, children fall an easy prey to anemia as majority of them remain ill-fed and undernourished due to poverty and ignorance. Globally 1.62billion people are anemic, while among the preschool children the prevalence of anemia is 47.4%.

Aim: To evaluate clinical and hematological profile of anemic children coming to Pediatric Department, P.D.U. Hospital, Rajkot to use automated hemogram for precise morphological sub-typing and correlating results of hemogram with etiology.

Methods: All children <12 years with anemia attending Pediatric Department and outdoor patient department of laboratory P.D.U. Hospital, Rajkot were evaluated, and hematological parameters were studied. Follow-up of treated cases were done, and special investigations were done in resistant cases of anemia.

Results: Total 300 children with anemia were studied, out of which 188 children had microcytic hypochromic anemia, 82 children had normochromic normocytic anemia, 30 children had dimorphic anemia and 7 children had macrocytic anemia.

Conclusion: In the cross-sectional study, peripheral smear and complete hemogram studies were done in all children. Automated hemogram parameters like mean corpuscular volume (MCV), red cell distribution width (RDW) and Mentzer Index were correlated with cause of anemia. Simple investigations like peripheral smear and automated hemogram can provide exact diagnosis in majority of cases.

Keywords: MCV, RDW, Bone.

Introduction

Anemia is a widespread public health problem associated with an increased risk of morbidity and mortality, especially in pregnant women and young children. Globally 1.62 billion people are anemic, while among the preschool children the prevalence of anemia is 47.4%. Anemia is defined as the hemoglobin (Hb) concentration of at least 2 standard deviations lower than age and sex specific average. In anemia, number of red blood cells (RBCs) is insufficient to meet the body's physiologic needs vary with a person's age, gender. The prevalence of anemia is an important health indicator as it affects not only physical development but also mental development. WHO expert group proposed that anemia should be considered to exist when Hb is below 11 gms/dl in children aged 6 months-6 years and 11.5gms in children aged 6-12 years.

Materials and Methods

The study was conducted in the P.D.U. Medical College and Hospital, a tertiary care hospital in Rajkot, Gujarat from January 2021 to December 2021. 300 children were referred to Outdoor Patient Department Pathology Laboratory from Pediatrics Department for hematological investigations. Children less than 12 years of age attending paediatric outdoor patient (OP) clinic and found to be anemic were enrolled in this study. Prospective study was done and evaluation of hematological parameters using automated hemogram (RBC Count, Hemoglobin, Total White blood cell (WBCs), Differential Count (DC), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Red Cell Distribution Width (RDW) And Platelet Count was done. The results of 300 children were shown in this study. For all children smears were prepared and air dried and stained by field's stain. Automated hemogram were done in all cases. Bone marrow examination, Perl's stain, osmotic fragility test, hemoglobin electrophoresis was done in special cases like Thalassemia major, Thalassemia trait, Sickle cell disease etc.

Observation and results

- Out of 300 patients, male patients(187) were found to be more anemic than female patients (113) in our study.(figure 1)
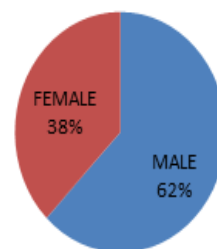

Figure 1: Pie diagram representing gender wise distribution of cases

Figure 2 shows Children's <3 years (158) are found to be most anemic as compared to other age group.
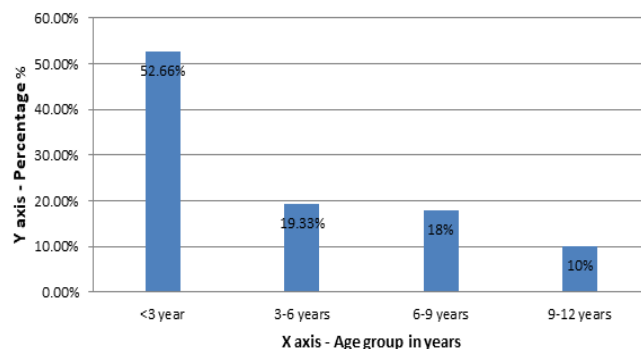

Figure 2: Bar diagram representing age wise distribution of cases

Almost half patients have anemia of moderate severity (142) with large number of severe cases(123) and few mild cases(35) presented in figure 3.
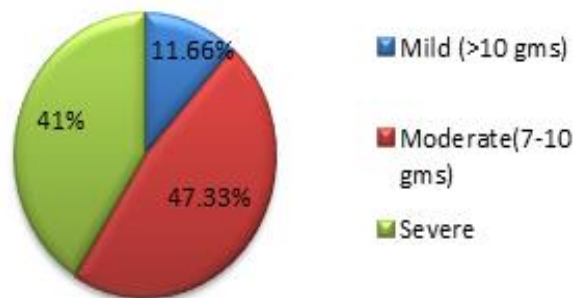
Figure 3: Pie diagram representing severity of anemia

Predominant morphological pattern of anemia is microcytic hypochromic anemia (189) followed by normochromic normocytic anemia (69), dimorphic anemia (30), macrocytic anemia (12) (figure 4)
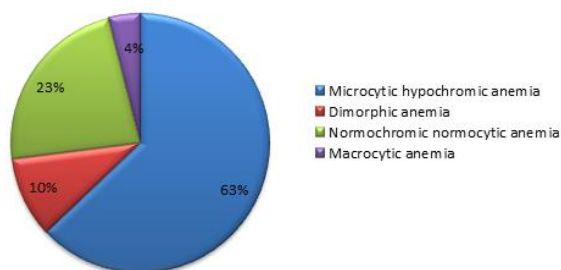

Figure 4: Pie diagram showing pattern of anemia.

Most common etiological cause of anemia in children were iron deficiency anemia (71.3%) followed by thalassemia major (12%), anemia of chronic disease (5.6%),immune hemolytic anemia (4.6%), thalassemia trait (2.62%), sickle cell disease (2.3%) , acute leukemia (1.6%).

Etiology	Total number n=300	Percentage (100%)
Iron deficiency anemia	213	71.3%
Thalassemia major	36	12%
Anemia of chronic disease	17	5.6%
Immune hemolytic anemia	14	4.6%
Thalassemia trait	8	2.6%
Sickle cell disease	7	2.3%
Acute leukemia	5	1.6%
Total	300	100%

Table 1: Etiology of anemia

Etiology	Elevated RDW	Normal RDW
Iron deficiency anemia	133	80
Thalassemia major	26	10
Anemia of chronic disease	7	10
Immune hemolytic anemia	7	7
Thalassemia trait	6	2
Sickle cell disease	4	3
Acute leukemia	3	2
Total	186	114

Table 2: Etiology of anemia and RDW

Comparison between etiological cause and RDW shows elevated RDW in most cases of iron deficiency anemia and thalassemia major while in other conditions RDW is found to be normal.

Discussion

In the present study the prevalence of anemia among children attending paediatric department Rajkot is 52% during. This prevalence can be compared to study conducted by Nkechi G et al[1], Shuchismita et al[4],Firdos et al[5].

Our study (Rajkot)	Nkechi et al(India) [2019] n=112714	Shuchismita et al(Bhuvneshwar) [2015]n=313	Firdos etal (Bangalore) [2012] n=882
71.3%	70.3%	62%	72.79%

Table 3:

The most common age group affected is <3 years (52.3%).This correlates with literature findings that IDA is common in infants and younger children.

Gender Predominance (M:F)			
Our study	Nkechi et al(India) [2019] n=112714	M muthuraman et al(Madurai) [2016] n-1181	Firdos et al (Bangalore) [2012] n=882
3:2	1:1	3:2	1.4:1

	Our study	M muthuraman et al (Madurai) [2016] n-1181	Firdos et al (Bangalore) [2012] n=882	Shuchismita et al (Bhuvneshwar) [2015] n=313
Mild anemia	11.66%	4%	12.7%	23%
Moderate anemia	47.33%	45.1%	75.82%	23%
Severe anemia	41%	50.9%	11.43%	16%

Table 4:

In our study boys are predominant and M: F ratio is 3:2.This is compared with other studies.

	Our study	M muthuraman et al (Madurai) [2016] n-1181	Firdos et al (Bangalore) [2012] n=882	Azmat Manzoor (Lahore) [2003] 116
Microcytic hypochromic anemia	63%	59.25%	49.1%	62.9%
Normochromic normocytic anemia	23%	28.2%	24.3%	29.3%
Macrocytic anemia	4%	7%	3.64%	10.3%

Table 5:

Morphologically microcytic hypochromic anemia is most common morphological type seen in our study accounting for 63% children with anemia. This finding is similar to the studies conducted by Azmat Manzoor et al where the incidence is 62.9%. Normochromic normocytic anemia is seen in 23% cases in our study. This finding is similar to the finding of Azmat Manzoor et al where the incidence is 29.3%. Macrocytic anemia is present in 4% cases in our study which is much lower than 10.3% incidence quoted by Azmat et al. Other studies are compared as above.

Iron deficiency anemia

	Our stud	Nkechi et al(India) [2019] n=112714	Kapoor et al(Delhi) [2002] n=545
Incidence	71.3%	70.3%	80%
Prevalence	70%	76.3%	73%

Table 6:

In our study Iron deficiency anemia is the most commonest cause for Microcytic Hypochromic Anemia. This finding is similar to studies conducted by Nkechi G et al where the incidence is 70.3%.

The total prevalence of Iron deficiency anemia among anemic children is 70% in our study. This prevalence is lower when compared to Kapoor et al 73% & Nkechi G et al 76.3%.

Conclusion

The diagnosis and treatment of anemia needs a stepwise approach. First in sequence and importance is morphologic classification using peripheral smear assessment and automated hemogram studies. Children who do not have evidence for any other disease are assumed to have iron deficiency anemia and empirical iron therapy should be given to those children. It is equally important to rule out the associated neoplastic conditions such as acute leukemia and aplastic anemia. Finally we have to do special studies in children who do not respond to treatment to ascertain the cause of anemia. Unfortunately majority of our population cannot afford these costly investigations and there exists huge discrepancies between developing countries and developed countries in prevalence of anemia. Strategies for minimising anemia in developing countries like India must include optimised iron intake but should simultaneously address poverty and food insecurity. Parental education and iron rich supplementary foods can prevent this important childhood problem to a large extent. Finally, we conclude with certain amount of

confidence that iron deficiency anemia is the most common cause of anemia in children. The peripheral smear study with automated hemogram is beneficial and sufficient for diagnosis and morphological sub tying of anemia for the paediatric population attending OP department of PDU medical college and hospital, Rajkot.

Summary

- The salient features observed in this study are

- Children referred to outdoor patient department, pathology laboratory from Paediatrics department for haematological investigations were enrolled in study.

- 300 children of them were found to be anemic.

- Peripheral smear assessment and complete hemogram studies were done for all children.

- Children in 1-3 age groups were commonly anemic.

- The most common morphological pattern observed was Microcytic Hypochromic anemia. (63%)

- The most common cause of anemia is Iron deficiency anemia (71%)

- Automated hemogram parameters like MCV, RDW and Mentzer Index were correlated with cause of anemia.

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