CLINICO-HEMATOLOGICAL PROFILE OF ANAEMIA AMONG PAEDIATRIC AT TERTIARY CARE TEACHING CENTER

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ABSTRACT

Background: Anemia is worldwide public health issue of substantial importance. It is an ancient disease, and commonest multifactorial ailment of mankind seen all over the world. Early diagnosis of anemia in pediatric age allows preventing its complications especially in a growing period and helps to guide further management. Anemia is the most common hematologic abnormality identified in infants and children. Anemia is not a specific disease entity per se but represents a heterogeneous group of pathologic conditions. In practice, anemia is defined by hemoglobin (Hb), hematocrit, or red blood cell count levels lower than the normal age- and sex-adjusted ranges.

Materials and methods: A prospective study, for a period of 3 years at Department of Paediatrics, Tertiary care Teaching Hopsital was conducted after obtaining ethical committee clearance of the institute. The children who were admitted in the hospital with sign of Pallor were selected as per inclusion criteria into the study. An informed consent was taken from parents, detailed history was recorded with particular emphasis on symptoms suggestive of anaemia such as weakness and easy fatiguability, breathlessness on exertion, pica. A thorough clinical examination of every child was done. Routine Investigations for anaemia and its causes were done. Anaemia was classified morphologically based on peripheral smear findings. Hemoglobin was estimated by Sahli's method and expressed in gm%, peripheral smear was stained by Leishman's stain.

Result: A total of 90 cases aged between 4- 12 years were included in the study. The most common affected age- group was 7- 8 years (61.1%). There was female preponderance in this study. (55.6% compared to males (44.4%). Weakness & fatigability were the most common presenting symptom observed in 88.9% of children. On General examination Pallor was seen in 100% of patients, knuckle pigmentation in 11.1%, and koilonychia in 44.4%. About 40 (44.4%)

children had severe anemia. 30(33.3%) moderate anemia and 20 (22.2%) mild anemia. (Table 4) Peripheral smear examination: Microcytic hypochromic anemia is seen in 88.9% (80/90). Dimorphic anemia is seen in 5.6%. Normocytic Normochromic anemia is seen in 5.6% of patients.

Conclusion: Besides haematological investigations for typing of anemia, Haemoglobin electrophoresis establishes the disease in haemoglobinopathies. Adequate health and healthy nutritional habits and prescription of Iron supplements are of great importance in prevention and management of anemia in children assisted by public health services.

Keywords: Anemia, Iron deficiency anemia (IDA), Sickle cell disorder, Vitamin B12 deficiency

INTRODUCTION

Anemia is the most common hematologic abnormality identified in infants and children. Approximately a quarter of the world's population suffers from anemia, almost 2 billion people, with almost half of children <5 years of age affected in 2016.[1] Anemia is associated with increased morbidity and mortality in children, particularly children of preschool age. There are many causes of anemia, both inherited and acquired, and these causes vary widely in populations across the world. [2] Anemia is not a specific disease entity per se but represents a heterogeneous group of pathologic conditions. Anemia is defined quantitatively as a decreased number of circulating erythrocytes or functionally as a condition where numbers of erythrocytes, carriers of oxygen, are insufficient to meet metabolic demands. In practice, anemia is defined by hemoglobin (Hb), hematocrit, or red blood cell count levels lower than the normal age- and sex-adjusted ranges. [3]

Use of appropriate ranges when defining anemia is important. Throughout the first year of life, erythrocytes lose their fetal and neonatal characteristics, changing globin composition, metabolism, size, volume, membrane structure, and function. [4] These changes are reflected by decreases in Hb, as well as mean corpuscular volume (MCV), mean corpuscular Hb (MCH), and mean corpuscular Hb concentration (MCHC). Hb levels gradually increase during childhood then level off during adulthood. [5] After puberty, gender differences occur due to menstruation and subsequent iron loss in females. Other factors influence Hb levels, such as diet, living at high altitudes, or smoking. Normalized Hb value curves have been developed for children living at high altitudes. [6] In addition, genome-wide association studies have revealed individual genetic variation contributes to differences in erythrocyte indices. [7]

Anemia can be classified in many ways, such as congenital or acquired, acute or chronic, hemolytic or nonhemolytic, based on peripheral blood (PB) smear findings, or based on erythrocyte size. [8] Hemolytic anemia may be further classified as inherited or acquired, immune or nonimmune, acute or chronic, whether hemolysis occurs in the vasculature (intravascular) or the reticuloendothelial system (extravascular), and whether there is a cellular defect of the

erythrocyte (intrinsic) or extracellular (extrinsic) abnormality. [9] Whereas most intrinsic defects are inherited, such as membrane disorders, metabolic defects, and Hb disorders, most extrinsic defects are acquired, such as immune-mediated anemia, systemic disease, and drug- or toxin-mediated effects. A few disorders, such as paroxysmal nocturnal hemoglobinuria, exhibit intrinsic and extrinsic hemolysis. [10]

MATERIALS AND METHODS

A prospective study, for a period of 3 years at Department of Paediatrics, Tertiary care Teaching Hopsital was conducted after obtaining ethical committee clearance of the institute. The children who were admitted in the hospital with sign of Pallor were selected as per inclusion criteria into the study. An informed consent was taken from parents, detailed history was recorded with particular emphasis on symptoms suggestive of anaemia such as weakness and easy fatiguability, breathlessness on exertion, pica. A thorough clinical examination of every child was done.

Routine Investigations for anaemia and its causes were done. Anaemia was classified morphologically based on peripheral smear findings. Packed-cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and red cell distribution width (RDW) were determined by automated cell counter. Hemoglobin was estimated by Sahli's method and expressed in gm%, peripheral smear was stained by Leishman's stain. Reticulocyte count was done by brilliant crystal stain method, serum iron determination was done by Ramany's dipyridyl method, Total iron binding capacity was determined by Ramsay's method, serum vitamin B12 and folic acid was determined by architect method.

Inclusion criteria used in the study was children of age group 6 months to 12 years with pallor, admitted in Medical College and Hospital, while exclusion criteria was infants less than 6 months of age and teenagers more than 12 years old, out patients who were not admitted in the hospital, patients who collapsed due to congestive cardiac failure within 12 hours of admission and patients with communicable diseases like humanimmunodeficiency virus (HIV), tuberculosis and hepatitis were excluded.

Data were entered in Microsoft excel 2023 and all statistical analyses were performed. Statistical package for the social sciences (SPSS) for Windows version 25.0, Chicago, USA, was also used for data analysis. Descriptive characteristics (mean and standard deviation) and percentage were performed for each parameter separately. Chi-square and independent - test were used for proportions and mean comparisons between groups, respectively.

RESULTS

Table-1: Criteria used for diagnosing anemia:-WHO Criteria for Anemia and Grade of severity [6]

Population	Non-Anemia (Gm/dL)	Anemia (Gm/dL)		
		Mild	Moderate	Severe
Children 6-59 months of age	9	9.0-9.7	8.0-8.7	<7.0
Children 5-11 years of age	10.7	10.0-10.2	7.0-8.7	<8.0
Children 12-14 years of age	11	10.0-10.7	7.0-9.8	<8.0
Non-pregnant women (15 years of age and above)	11	10.0-10.7	7.0-9.8	<8.0
Pregnant women	10	9.0-9.8	6.0-8.8	<7.0
Men (15 years of age and above)	12	10.0-11.8	7.0-9.8	<8.0

A total of 90 cases aged between 4- 12 years were included in the study. The most common affected age- group was 7- 8 years (61.1%) (Table 2)

Table-2: Age-wise distribution of cases.

Age in years	No. of cases	%
5-6 years	25	27.7
7-8 years	55	61.1
9-10 years	05	5.6
11-12 years	05	5.6
Total	**90**	**100**

Table-3: Clinical signs and symptoms.

Clinical signs and symptoms	No. of cases	%
Pallor	90	100%
Icterus	25	27.7%
Fever	35	38.9%
Cough	25	27.7%
Hyperpigmentation	10	11.1%

Weakness and fatigability	80	88.9%
Splenomegaly	10	11.1%
Tremors	10	11.1%
Hepatomegaly	15	16.7%
Petechiae	05	5.6%
Vomitings	25	27.7%
Shortness of breath	10	11.1%
History of Pica	25	27.7%
Koilonychias	40	44.4%

There was female preponderance in this study. (55.6% compared to males (44.4%). Weakness & fatigability were the most common presenting symptom observed in 88.9% of children. On General examination Pallor was seen in 100% of patients, knuckle pigmentation in 11.1%, and koilonychia in 44.4%. (Table 3)

Table-4: Severity of anemia (according to Hb %)

Grade of Anemia	**Males**	**Females**	**Total**	**%**
Mild	10	10	20	22.2
Moderate	10	20	30	33.3
Severe	20	20	40	44.4
Total	**40**	**50**	**90**	**100**

About 40 (44.4%) children had severe anemia. 30(33.3%) moderate anemia and 20 (22.2%) mild anemia. (Table 4) Peripheral smear examination: Microcytic hypochromic anemia is seen in 88.9% (80/90). Dimorphic anemia is seen in 5.6%. Normocytic Normochromic anemia is seen in 5.6% of patients.

Table-5: Showing relation of RBC indices in anemia.

Relation of RBC indices in anemia.	**Iron deficiency anemia**	**Megaloblastic anemia**
PCV↓	70(77.8%)	20(22.2%)
MCV↓	70(77.8%)	-
MCV↑	-	20(22.2%)
MCH↓	70(77.8%)	-
MCH↑	-	20(22.2%)
MCHC↓	70(77.8%)	20(22.2%)
MCHC normal	-	20(22.2%)
RDW↑	70(77.8%)	-
RDW↓	-	20(22.2%)

In Iron deficiency anemia PCV, MCV, MCHC, MCH are decreased and RDW is increased. In megaloblastic anemia PCV decreased, MCV and MCH are increased, and MCHH are normal. 22.2 % patients having serum level < 30 µg/dl while 77.8% patients having serum Iron level between 30-60µg/dl.

DISCUSSION

In the present study, 316 patients of anemia between the age group of 2 months-14 years have been studied clinically as well as by other investigations. The common cause in the study is iron deficiency (58%) while sickle cell disorders 27%, 9 % were thalasemic and 5 % cases had megaloblastic anemia and 2 % aplastic anemia. The increased prevalence of sickle cell disorder is due to our hospital being a referral Centre for both Adilabad and Karimnagar districts, Telangana, India. Prevalence of Sickle cell disorder in overall population is very high amongst tribal population. The same tribal population groups residing in the neighbouring district of Adilabad and Nizamabad have high prevalence of Sickle cell disorder. The overall prevalence among tribal population is about 10% for the carrier state and 0.5% for sufferer. [11-14]

It is observed from our study that all types of anemia were due to poverty, maternal anemia, continued exclusive breast feeding beyond 6 months and improper complimentary diet. Males with high percentage of 55% and females with 45% were found in our study. Rationale reason for the cause of anemia more in male as compared to females can be because of expression of anemia due to sickle cell disorder or Thalassemia in males as compared to females. [15] In the present study, pallor is the most common symptom followed by splenomegaly and cough. This is in accordance to previous studies fever, splenomegaly, hepatomegaly was found in our study, which is in accordance previous studies. [16]

In the current study 58% patients with iron deficiency anemia, 27% patients with sickle cell disorder, 9% with thalasemia were transfused packed cell volume. Remaining patients were managed by oral hematinics.

CONCLUSION

One of the major areas for improvement in primary health care is prevention of anemia because it has been associated with delay in psychomotor development especially in preschool age. Appropriate screening and subsequent diagnostic testing will allow most cases of anemia to be diagnosed at the earliest. Basal blood parameters are mandatory before treating children with anemia to avoid unwanted side effects. Anemia in association with malnutrition is widely prevalent in our country. So there is a need for urgent community participation strategies in the form of counseling the parents for child feeding practices, immunization and sickness recognition from the first year of life. Preventive measures for anemia control in children must

be accompanied by measures to prevent underweight and stunting by focusing on integrated child feeding, health and environmental core measures.

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