e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(11); 483-489

Original Research Article

Etiopathological and Clinical Study of Anemia of Children between 1 Year to 12 Years of Age

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Received: 19-08-2023 / Revised: 26-09-2023 / Accepted: 28-10-2023
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Conflict of interest: Nil

Abstract

Background & Objectives: To study etio-pathological and clinical aspects of different types of anemia in age group of 1 year to12 years.

Methods: This study was conducted in Department of Pediatrics, Jawahar Lal Nehru Medical College andHospital, Bhagalpur, Bihar from October 2020 to October 2022 among children between 1 year to 12 years of age. the study was prospective and time bound.

Results: The study group which consisted of total 100 hospitalized patients who were admitted with anemia according to WHO classification. Out of 100, 45 were females and 55 were males. In the study group, maximum casesbelonged to school going age group (64% of total).

Maximum cases had moderate anemia (65% of total). When we studied the distribution of different causes of anemia within the study group, IDA (74%) is the most common type followed by anemia of chronic diseaseand malaria among all age group. The incidence of generalized lymphadenopathy and hepatosplenomegaly were maximum in case of IDA. All cases of aplastic anemia and leukemia had bleeding manifestations.6out of 27 patients of severe anemia had koilonychia.

Conclusions: Incidence of anemia is very high in age group of 1 year to 12 years. IDA is the mostcommon cause. Specific public health actions are urgently required to stop the damaging impacts on physical and mental health as well as their long – term consequences.

Keywords: Anemia, Children.

Introduction

Anemia can be defined as "a reduction in values of hemoglobin or RBC volume below the range of values occurring in healthy persons of the same age, race and sex." It is one of the commonest diseases affecting mankind and is a very important cause affecting mortality and morbidity in general population. According to an estimate by the World Health Organisation (WHO), "40% of children 6-59 months of age, 37% of pregnant women, and 30% of women 15-49 years of age worldwide are anemic." Almost 1/3rd of the total preschool anemic children, estimated to be 293 million, are from India. In rural India, "prevalence of anemia in children of age 6-35 months is 80.9%." Most important cause in this age group is Iron deficiency. Other causes, including Vitamin B12 and Folate deficiency, malaria, marrow hypoplastic syndrome, myeloproliferative syndrome and chronic systemic diseases are also important causes of anemia. "As we do in any other medical condition, a detailed history, physical examination and laboratory investigations form the cornerstone of diagnosis".[1] Early findings of anemiaare pallor, sleepiness, irritability and decreased exercise tolerance. However, if the fall in haemoglobin is very slow, these clinical features may not be apparent until the haemoglobin drops below 7-8 gm/dl. Pallor can be observed in lower palpebral conjunctiva, tongue, nail beds and palm clinically. A flow murmur may be found in severe cases. Severe anemia can lead to weakness, breathlessness on exertion, tachycardia, cardiomegaly and high output cardiac failure. Also, certain clinical findings are related to some specific causes of anemia. According to National Family Health Survey, weight loss, stunted growth and wasting in Indian children is higher than any other country in the world, and 67 percent of children have some degree of anemia (NFHS 2019-21).

Aims and Objectives

1. To study etio-pathological aspects of different types of anemia in 1-12years age group.
2. To study the clinical aspects of different types of anemia in pediatric agegroup 1-12 years.

Materials and Methods

The study was conducted in children from 1 year to 12 years of age hospitalized in Jawaharlal Nehru Medical College and Hospital, Bhagalpur Pediatric Ward and admitted with anemia (but type of anemia not pre-diagnosed) according to WHO definition.

Source of Data: Children 1-12 years, coming to Department of Pediatrics, JLNMCH, Bhagalpur who will have pallor (not previously evaluated), admitted between October 2020 and October 2022.

Type of Study: Prospective and time bound study on children admitted with pallor.

Inclusion Criteria: Children 1-12 years, admitted to Department of Pediatrics, Jawahar Lal Nehru Medical College and Hospital, Bhagalpur who have anemia according to WHO criteria (not previously evaluated), admitted between October 2020 and October 2022 and whose parents gave consent for evaluation.

Exclusion Criteria: Children who will not conform to the above criteria, and those whose parents will not give consent despite conforming to the above criteria.

Method of Collection of Data: Children 1-12 years, visiting Department of Pediatrics, JLMCH, Bhagalpur who had anemia according to WHO criteria (not previously evaluated), admitted between October 2020 and October 2022 and whose parents gave consent for evaluation were included in the study.

After obtaining informed written consent, patients were clinically evaluated, and laboratory assessment were conducted. Children were investigated with complete blood counts, reticulocyte count, stool and urine tests with routine and microscopic examination. Special tests like serum ferritin, serum TIBC, MPDA, liver and renal functiontests, HPLC and bone marrow examination were used in relevant cases.

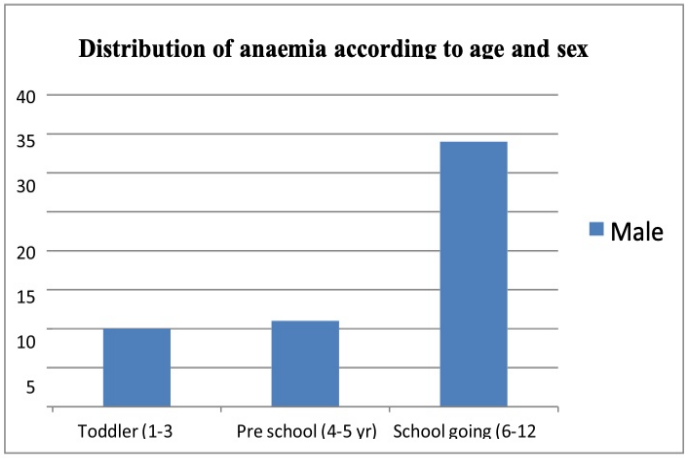

Figure 1: Distribution of anaemia according to age and sex

Distribution of severity of anemia

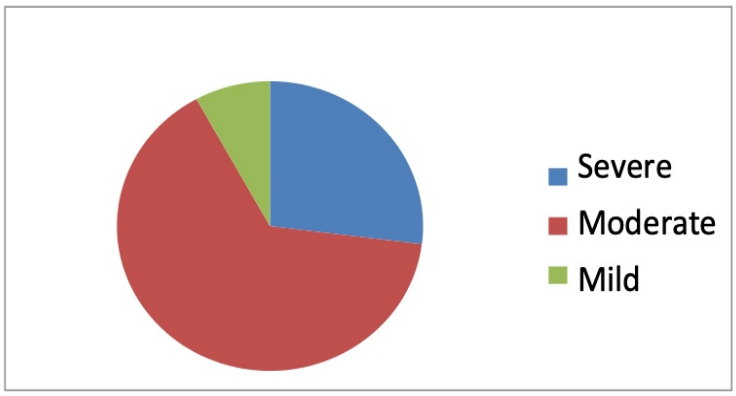

Figure 2: Distribution of severity of anemia

Table 1: 'Distribution of anaemia according to age and sex'

Age	Male	Female	Total
Toddler (1-3 yr)	10	8	18
Preschool (4-5 yr)	11	7	18
School going (6-12 yr)	34	30	64
Total	55	45	100

Table 2:

Severity	No. of cases
Severe	27
Moderate	65
Mild	8
Total	100

Table 3: 'Distribution of various types of anemia in the community'

Age	IDA	Thalassemia	Malaria	Aplastic Anemia	AOCD	Leukemia	AIHA
Toddler (1-3 yr)	14	3	0	0	0	0	1
Preschool (4-5 yr)	12	0	1	3	1	1	0
Schoolgoing (6-12 yr)	48	0	4	0	6	4	2
Total	74	3	5	3	7	5	3

Table 4: Distribution of Generalised Lymphadenopathy In Study Population

	IDA	Thalassemia	Malaria	Aplastic Anemia	AOCD	Leukemia	AIHA
Lymphadenopathy	14	0	0	0	5	5	0

Table 5: Distribution of hepatosplenomegaly in study population

	IDA	Thalassemia	Malaria	Aplastic Anemia	AOCD	Leukemia	AIHA
Hepatosplenomegaly	23	3	5	0	6	5	0

Table 6: Distribution of bleeding manifestations in study population

	IDA	Thalassemia	Malaria	Aplastic Anemia	AOCD	Leukemia	AIHA
Bleeding manifestation	1	0	0	3	0	5	0

Table 7: Distribution of icterus in study population

	IDA	Thalassemia	Malaria	Aplastic Anemia	AOCD	Leukemia	AIHA
Bleeding manifestation	0	3	3	0	0	0	3

Table 8: Distribution of koilonychia in severe anemia

Without koilonychias	21
With koilonychias	6

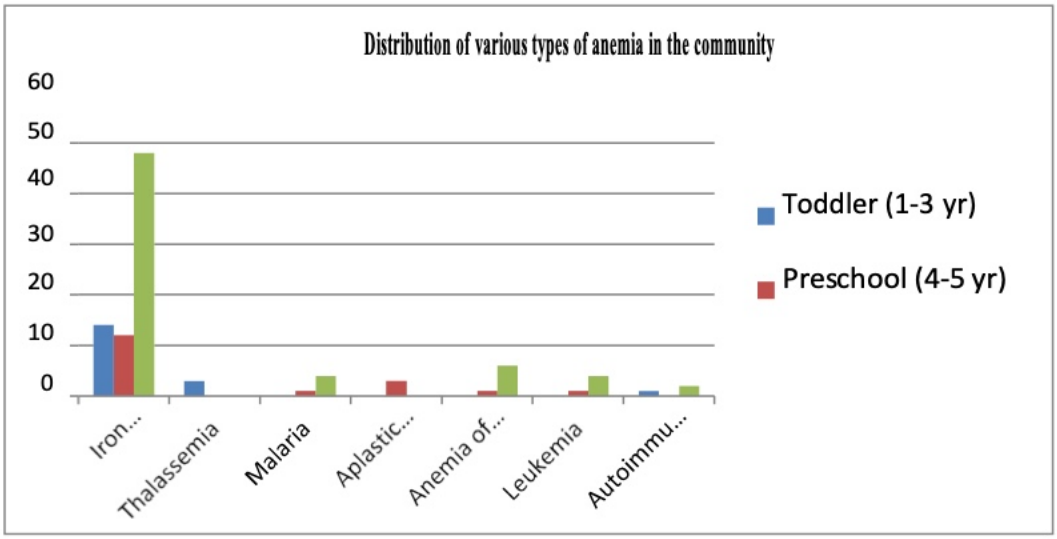

Figure 3: Distribution of various types of anemia in the community

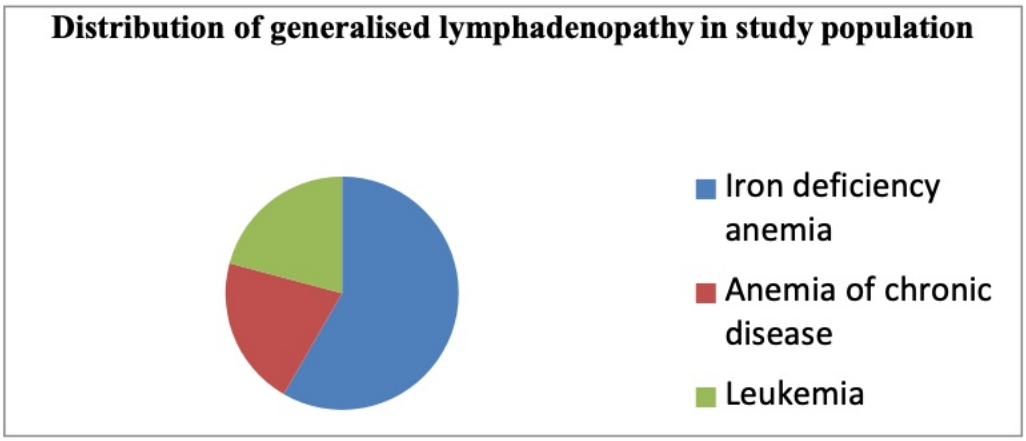

Figure 4: Distribution of generalised lymphadenopathy in study population

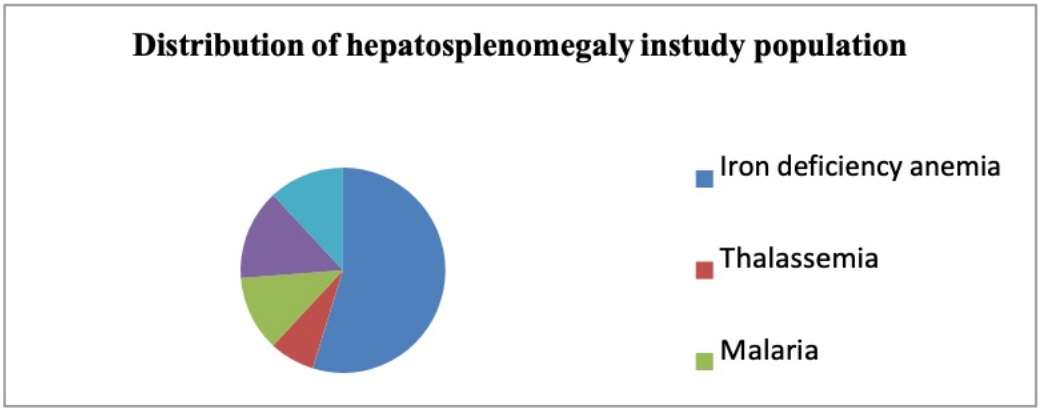

Figure 5: Distribution of hepatosplenomegaly instudy population

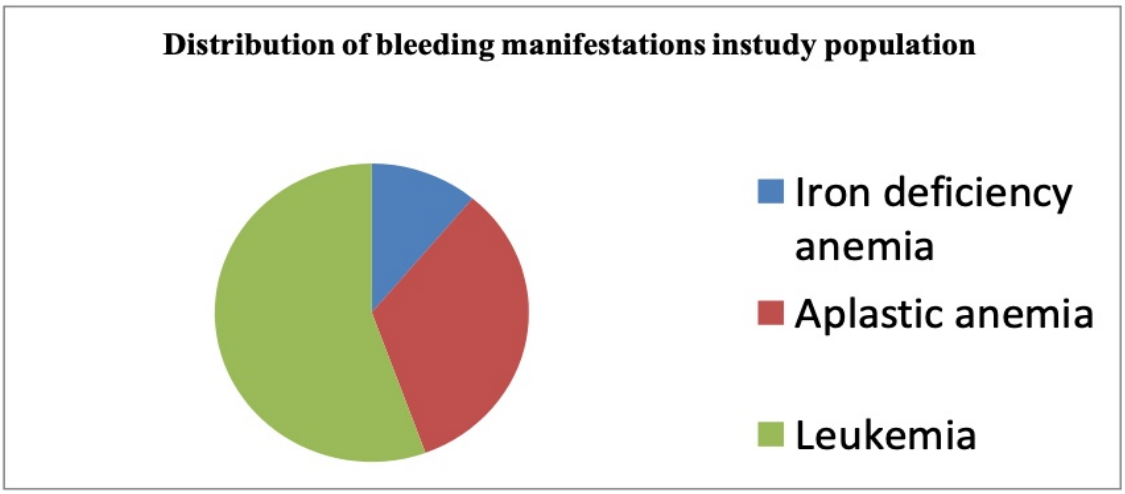

Figure 6: Distribution of bleeding manifestations instudy population

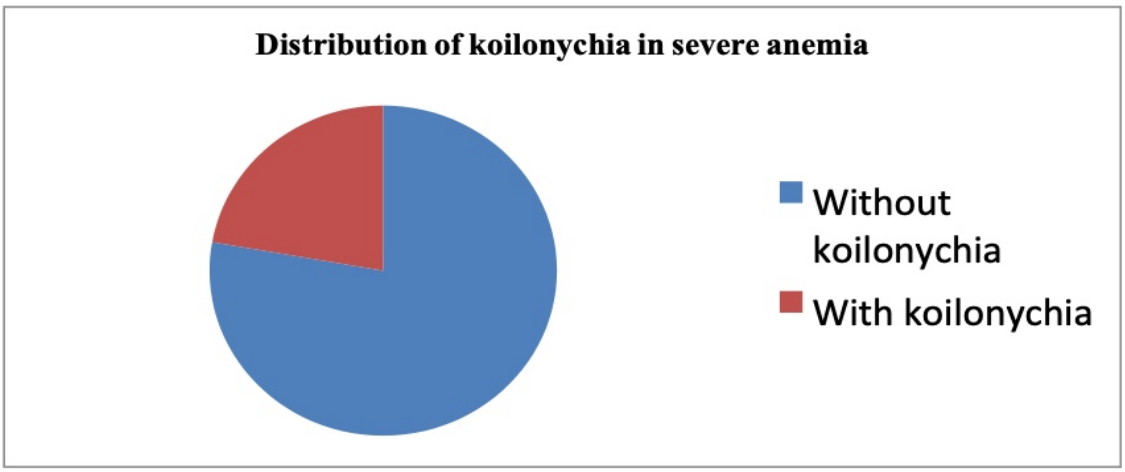

Figure 7: Distribution of koilonychia in severe anemia

Discussion

The study group consists of total case of 100 hospitalised patients (1-12years) who were admitted with anemia according to WHO classification.

Table 1 shows that out of 100 patients, 45 were female and 55 were male. So, the male and female patients were almost equal in number. A similar sex distribution was found in the study conducted by Gomber et al [17], in which "out of 95 children studied for etiology of anemia, 51 were boys and 44 were girls."[15] There was no difference in sex distribution in the study conducted by Kapoor et al [18, 16]

Among the 100 patients in the study group maximum children belonged to school going age (6-12 years) (64% of total study group). However according to NFHS 1998-99 [13], "74% of children in age group 1-3 year were anemic." In study conducted by Gomber et al.[17], "76% of children were anemic in the age group of 3 months to 3 years" [15]. Osorio et al have noticed the incidence of anemia to be 40.9% in age group of 6-59 months.

Table 2 showed that maximum patients had moderate anemia (65% of total study group) probably due to poor nutritional status of the community. In the study conducted by Vishwanath et al [19], "48% had mild, 42% had moderate and 10% had severe anemia."[17]

Table 3 shows the distribution of different causes of anemia within the study group. Iron deficiency anemia (74% of the study group) is the most common type followed by anemia of chronic type and malaria across all age groups. In the study conducted by Vishwanath et al [19], "it was found that out of 100 children evaluated 89 had iron deficiency anemia."[17] In the study conducted by Gomber et

al [17], "iron deficiency anemia is the most common."[15]

All the thalassemia cases were E beta thalassemia and were diagnosed in the toddler age group (1-3 years).

Table 4 shows that incidence of generalised lymphadenopathy is maximum among those having iron deficiency anemia probably due to the fact that the children were admitted with a systemic illness and iron deficiency anemia was diagnosed on evaluation of associated pallor. However, all cases of leukemia and a lion's share of the cases of anemia of chronic disease had generalised lymphadenopathy.

Table 5 shows that incidence of hepatomegaly/hepatosplenomegaly is maximum among those having iron deficiency anemia probably due to the fact that the children were admitted with a systemic illness and iron deficiency anemia was diagnosed on evaluation of associated pallor.

However, all cases of malaria, leukemia and thalassemia and a lion's share of the cases of anemia of chronic disease had hepatosplenomegaly.

Table 6 shows that all cases of aplastic anemia and leukemia had bleeding manifestations.

Table 7 shows that all cases of thalassemia and autoimmune hemolyticanemia had mild icterus. Also 3 out of 5 malaria cases also had mild icterus.

Table 8 shows that 6 out of 27 patients having severe anemia had koilonychia (22% of the study group).

In our study group the mean Hb, MCV and RDW was 7.67 gm/dl, 71.08 and 17.86 with a standard deviation of 1.58, 7.65 and 3.79 respectively. RDW was highest in iron deficiency group. Mean Hb of 7.67 with most of the cases having iron deficiency anemia indicates poor nutritional status of the community. In the study conducted by Aulakh et al [22], "among the iron deficiency anemia group mean RDW value among children with mild, moderate and severe anemia was 15.5 ± 1.78%, 16.95 ± 1.91% and 19.55 ± 1.32% respectively.[18]

Occurrence of hemoglobinopathies in the study group was 3%. All of them were E beta thalassemia and none were beta thalassemia major indication earlier presentation of the latter (mostly in infancy) whereas E beta thalassemia generally presents after 1 year of age.

Summary and Conclusion

Incidence of anemia in 1-12 years age group is very high. Iron deficiency anemia is the most prevalent anemia.

So, there is a need to implement specific public health measures to avoid the serious consequences on the physical and mental development of these children and on their long-term health.

A focussed history and appropriate diagnostic tests are necessary to diagnose most cases of anemia. There is need to develop a standardized definition of screening criteria. Because anemia is frequent in infants, screening should be done at this age. One of the most significant advantages of improving primary health is the prevention of nutritional deficiency anemias, which is both frequent and preventable.

Iron deficiency anemia has been linked to visual and auditory problems, cognitive and behavioural disorders and delay in psychomotor development. The children with iron deficiency have to be diagnosed at the earliest. Further treatment and follow up at Primary care level is necessary so that the complications such as behavioural and cognitive disturbances can be prevented.

The causes of anemia are multifactorial, and nutritional deficiency and infection play important roles in it. Filling knowledge gaps in research and policy, as well as improving the execution of effective population-level interventions, can assist to reduce the impact of anemia in a poor country likeours.

Limitations of the Present Study

1. Data are restricted to single institution.
2. Some investigations could not be done due to limited infrastructure ofthe hospital.
3. The study was done only on cases admitted to the hospital which represents the "tip of iceberg phenomenon".

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