Study of clinicopathological profiles of anemia in children of 6 months to 17 years age in north central region of Madhya Pradesh

[1]Dr. Atul Jain, [2]Dr. Shikha Agarwal, [3]Dr. Devendra Ahirwar, [4]Dr. Deepika Shukla, [5]Dr. Amar Gangwani

[1]Associate Professor, [2]Assistant Professor, [4]Senior Resident, [5]Professor and Head, Department of Pathology, Bundelkhand Medical College, Sagar, Madhya Pradesh, India
[3]Associate Professor, Department of Medicine, Bundelkhand Medical College, Sagar, Madhya Pradesh, India

Corresponding author :Dr. Deepika Shukla
Email: dr.deepikachaturvedi@gmail.com

Abstract

Background: Anemia is an indicator of both poor nutrition and poor health. It is caused by multiple factors. Approximately 50% of all anemia can be attributed to iron deficiency (ID), with the rest due to conditions such as deficiencies of other key micronutrients including folate, vitamin B12, or vitamin A deficiency, chronic inflammation, infectious diseases such as malaria, HIV/AIDS, hookworm infections, and urinary schistosomiasis; and inherited disorders that affect RBCs such as thalassemia, where diets are based mostly on staple foods with little meat intake

Aims and Objective: The aim of this study was to find the clinicopathological profile of anemia in different age group, sex, and its pattern of severity in hospitalized children in north central region of Madhya Pradesh

Material & Methods: The present study was a retrospective study carried out in tertiary care center, the department of pathology BMC SAGAR. among children with anemia and those admitted with other complaints but incidentally have found to have anemia

Result: In our study, Microcytic hypochromic picture in 30%, normocytic normochromic in 58%, Dimorphic anemia 9% and macrocytic in 3% cases.

Discussion: In our study, normocytic normochromic in picture in 58%, microcytic hypochromic in 30%, Dimorphic anemia 9% and macrocytic in 3% cases. However, Zhao A et al, in their study found microcytic hypochromic picture in 49%, dimorphic in 24%, normocytic normochromic in 22% and macrocytic in 4% cases. Chhabra et al, in their study showed that microcytic hypochromic picture was common in all age groups and was significantly associated with iron deficiency anemia.

Conclusion: The present study was perhaps the first providing the overview of anemia in children in such diversified age. In our study predominantly we found normocytic normochromic anemia followed by microcytic hypochromic anemia.

Keywords: children, anemia, clinicopathological profiles

Introduction

Anemia is a global public health problem affecting both developing and developed countries. It occurs in all stages of the life cycle, but it is more prevalent in pregnant women and young children. Anemia in children is one of the major social health problems in India and in many parts of the world, since anemic children have reduced exercise capacity, slower rate of growth, impaired cognitive development, and delayed wound healing[1].

Anemia is an indicator of both poor nutrition and poor health. It is caused by multiple factors. Approximately 50% of all anemia can be attributed to iron deficiency (ID), with the

rest due to conditions such as deficiencies of other key micronutrients including folate, vitamin B12, or vitamin A deficiency, chronic inflammation, infectious diseases such as malaria, HIV/AIDS, hookworm infections, and urinary schistosomiasis; and inherited disorders that affect RBCs such as thalassemia, where diets are based mostly on staple foods with little meat intake[2].

Surveillance of anemia is challenging, requiring simultaneous understanding of the epidemiology of its underlying causes. Focusing only on total haemoglobin levels invites misinterpretation of trends because changes in severity may be missed. Estimates in high-risk populations suggest that total anemia prevalence may be as high as 50% to 80%, with as many as 10% to 20% having moderate to severe anemia. Prevalence is consistently higher in people with low socioeconomic status, low body weight, and in females who have recently given birth[3].

Global cause-specific analyses have tended to focus only on tracking iron deficiency or on single countries or regions. In 2019, global anemia prevalence was 39.8% (95% UI 36.0%, 43.8%) in children aged 6 months to 17 years, equivalent to 269 million children with anemia. The prevalence of anemia in children under 17 years were highest in the African Region, 60.2% (95% UI 56.6%, 63.7%). Since 2000, the global prevalence of anemia in children under 17 years has slowly decreased over the years, from 48.0% (95% UI 45.1%, 51.0%) to 39.8% (95% UI 36%, 43.8%), and from 2010, it has been stagnant. As per the World Health Organization (WHO), prevalence of anemia in preschool-age children worldwide is around 50%.Prevalence in India is even higher[4].

According to National Family Health Survey 4 (NFHS 4) data, prevalence of anemia in children in the age group of 6 months to 17 years had declined to around 60% from 79% in the NFHS 3 data. But a systematic analysis of global anemia burden from 1990 to 2010 revealed that children under the age of 17 years had the highest prevalence in all regions of the world with the highest mean severity in all low- and middle-income countries. The study further suggests that the burden of anemia as measured by the years lived with disability (YLD) has increased in all ages between 1990 and 2010. In young age groups, increased anemia-related YLD were driven by increased prevalence or a population growth[5].

Hospital-based studies to determine the prevalence of anemia in children in India are few. Prevalence of anemia has been reported to variously between 55% and 72%. In addition, most of the studies are limited to the infancy age group. Prompted by this seemingly high prevalence of anemia among children under 5 years of age admitted to hospital for various reasons, combined with the fact that currently there is limited information on the prevalence and patterns of anemia among children, especially beyond infancy in north central region of M.P[5].

Aims and objective

The aim of this study was to find the clinicopathological profile of anemia in different age group, sex, and its pattern of severity in hospitalized children in north central region of Madhya Pradesh.

Material & methods
Study design and study setting

The present study was a retrospective study carried out in tertiary care center, the department of pathology BMC SAGAR. among children with anemia and those admitted with other complaints but incidentally have found to have anemia.

Study period
The study was carried out between January 2022 to February 2023

Study population
The study population included children 6 months –17 years of age who were admitted to BMC SAGAR

Inclusion criteria
Children (6 months –17 years) admitted between January 2022 to February 2023 to this pediatric tertiary care institute who had a complete blood count done were included in this study. The children were further assessed for anemia as per the age-appropriate WHO criteria.

Exclusion criteria
- Children who could not be tested for complete blood count after admission
- Children who were readmitted within the study period
- Outdoor cases.

Ethical approval
The hospital institutional ethics committee approved the study. The objectives and process of the study were explained to the guardian, informed consent was obtained, and confidentiality was assured.

Sample size
The sample size was calculated to be 2669 based on the prevalence of anemia among pediatric inpatients from a previous study which was 55% with 7% absolute precision using the formula 4 pq/d2 where P is the prevalence, q is $100 - p$, and d is the absolute precision. Structured proforma was created and was pretested before initiating the actual study. Complete blood count, erythrocyte sedimentation rate, C-reactive protein, and iron studies were done. WHO criteria were used to diagnose and grade severity of anemia among study subjects.

Data analysis
Data were analyzed by Epi Info. Descriptive statistics was used. Independent t-test and analysis of variance were used to compare means. P value < 0.05 was taken as statistically significant.

Result
Table-1 Age wise distribution of anemia

	6 mo-12 mo	1-5 y	6-10 y	11-17y
Male	480	319	157	316
Female	695	214	217	271
Total Patients	1175	533	373	587

Our study shows, out of total patients maximum patients belongs to 6 -12 months age group followed by 11-17 years

Table-2 Gender wise distribution of anemic subject

Gender	No of cases	%
Male	1175	44
Female	1194	56
Total	2669	100

Our study shows, among study patients females suffer more from anemia

Table-3 Laboratory parameter of children with anemia

Mean Hemoglobin (g/dl)	9.3±1.4
Mean MCV (fl)	73.6±8.8
Mean MCH (pg)	24.0±3.5
Mean MCHC %	32.2±2.6
Mean RDW %	16.3±3.4
Mean RCB (million /mm)	4±0.7

These are the laboratory parameters of the children suffering from anemia

Table- 4 Distribution of various morphological type of anemia

Morphological variation	No.of cases	%
Microcytic hypochromic	800	30
Normocytic normochromic	1549	58
Dimorphic anemia	240	9
Macrocytic anemia	80	3

In our study, Microcytic hypochromic picture in 30%, normocytic normochromic in 58%, Dimorphic anemia 9% and macrocytic in 3% cases.

Table-5 Severity of anemia on basis of Hemoglobin (Grading of anemia)

Hemoglobin (gm/dl)	Male	Female	Total	%
Mild(> 10)	537	583	1120	42
Moderate (7-10)	374	375	749	28
Severe(< 7)	272	528	800	30

In our study, According to WHO criteria for diagnosis and assessment of severity of anemia, a total of 2669 children were graded as having mild anemia 1120 (42%), followed by 800 (30%) were graded as having severe anemia and remaining moderate anemia 749 (28%).

Table-6 Clinical profile of patient anemia

Clinical feature	No. of cases	%
Pallor	2461	92.2
Weakness /fatigability	2103	78.8
Fever	1452	54.4
Icterus	443	16.6
Shortness of breath	117	4.4
Hepatomegaly	267	10
Cough	326	12.2
History of Pica	337	8.9
Splenomegaly	59	2.2
Petechiae	29	1.1
Vomiting	59	2.2
Koilonychia	88	3.3

Hyperpigmentation	59	2.2

The most common clinical feature is pallor which is seen in approximately 92% of patients followed by weakness which is seen in approximately 78% of patients

Discussion

Pediatric anemia is an important universal problem. It is a critical issue which needs to be addressed on a priority basis especially in the developing countries. Nutritional anemia is a recognized public health problem worldwide. In India, anemia is the most common nutritional problem affecting more than half of the total population, particularly the children and the pregnant women. Iron deficiency anemia is the commonest form of nutritional deficiency in the world responsible for the staggering amount of ill health, cost productivity, increased mortality and morbidity. Even in the developed countries, iron deficiency with or without anemia is still prevailing in infants, toddlers, adolescent females and women of the child bearing age. It remains the most common hematologic disease in infants and children. Given the detrimental long-term effects and high prevalence of iron deficiency, its prevention in early childhood is an important public health issue[6-8].

In the present study, more females were found to be anemic as compared to males .A similar gender distribution was noted in the study by Gomber. Whereas, in a study conducted by Kapur et al. there was no difference in the gender distribution. In the present study, preschool children were maximally affected which is in concurrence with the study by Stellinga-Boelan. Whereas, in a study by Sharada. the school going children were maximally affected (75%) and in a study by Susan infants were maximally affected (64%)[9-11].

In our study, normocytic normochromic in picture in 58%, microcytic hypochromic in 30%, Dimorphic anemia 9% and macrocytic in 3% cases. However, Zhao A et al, in their study found microcytic hypochromic picture in 49%, dimorphic in 24%, normocytic normochromic in 22% and macrocytic in 4% cases. Chhabra et al, in their study showed that microcytic hypochromic picture was common in all age groups and was significantly associated with iron deficiency anemia[12-16].

In our study, according to WHO criteria for diagnosis and assessment of severity of anemia, out of 2669 children, children who were graded as having mild anemia 1120 (42%), followed by 800 (30%) were graded as having severe anemia and remaining moderate anemia 749(28%) . In the present study, mild degree of anemia was found in the maximum number of cases (42%), whereas, in a study by S. Jain moderate degree of anemia (49.8%) was the most prevalent type[17].

The majority of infants in our study group were admitted with chief complaints of weakness/fatigability (78%) and fever (54%). Other illnesses reported were icterus, cough, hepatomegaly, and Pica habits. Almost similar trend was witnessed by Nyamasege who found weakness/fatigability to be the most common illness in his study group[18].

The probable factors contributing to the prevalence of severe anemia in the present study may be attributed to the low socioeconomic status, illiteracy and ignorance of the parents because of which most of the children would have developed severe degree of anemia at the time of presentation. Besides this, the present study was undertaken in the tertiary care hospital where patients were brought in only after the initial screening and a significant lapse of time[19].

One of the most important areas for scope in the improvement of primary health care is prevention of nutritional deficiency because; it has been associated with delay in psychomotor development and increased morbidity and mortality in children. Steps need to be undertaken to educate the masses and improve their living standards, so that, the initial symptoms of illness are not ignored and the children are brought to the hospital at the earliest for timely diagnosis and effective management[20-21].

Conclusion

The findings of present study provided a clinicopathological overview of anemia in children in a hospital based study. The present study was perhaps the first providing the overview of anemia in children in such diversified age. In our study predominantly we found normocytic normochromic anemia followed by microcytic hypochromic anemia. One of the limitations of the study was our inability to get a detailed record of dietary and nutritional pattern and preferences of the children owing to which the etiology of anemia could not be established completely. Further studies with a comparative data from community along with detailed dietary intake and preference pattern might help in understanding and differentiating the prevalence, pattern and etiology of the anemia in children.

Source of Support

Nil.

Conflict of Interest

None Declared.

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