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Clinicopathological Profiles of Anemia in Children of 6 Months to 17 Years Age

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ABSTRACT

Introduction: Anaemia is defined as a decreased concentration of hemoglobin and RBC mass as compared to the values in age-matched controls. Anaemia 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. The aim of this study was to find the prevalence of anemia in different age group, sex, and its pattern of severity in hospitalized children.

Materials and methods: This are a Retrospective Study conducted in the Department of Pediatrics, Apollo Institute of Medical Sciences and Research among Children with Anemia and those Admitted with other Complaints but Incidentally have Found to have Anemia**.** During physical examination following signs and symptoms were noted: Pallor, edema, clubbing, skin (dryness, rashes, irritation), abnormal pigmentation, coarse hair, puffiness of face, thinning of eyebrows, nail defects, ulceration, abnormalities in genitalia, hand and feet abnormalities, nose, eyes, cranium, ear and face. Grading of anemia among different age groups was done using WHO Hemoglobin concentrations for the diagnosis of anemia and assessment of severity criteria. Microscopic evaluation of blood was also done to obtain the microscopic picture.

Result: In our study, According to WHO criteria for diagnosis and assessment of severity of anemia, a total of 90 children were graded as having mild anemia 40 (44.4%), followed by 35

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

(38.9%) were graded as having severe anemia and remaining moderate anemia 15 (16.7%). Microcytic hypochromic picture in 56%, Normocytic hypochromic anaemia 18.8%, normocytic normochromic in 12.2%, Dimorphic anaemia 7.7% and macrocytic in 4.4% cases.

Conclusion: Paediatric anaemias are very common since children are the most vulnerable population for occurrence of these anaemias. This necessitates prompt screening and early diagnosis through investigations by utilization of available advanced technical modalities in order to initiate timely treatment and appropriate management.

Keywords: Complete hemogram; Iron deficiency anaemia; Thalassemia.

INTRODUCTION

Anaemia is defined as a decreased concentration of hemoglobin and RBC mass as compared to the values in age-matched controls. Anaemia 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 a global public health problem especially in developing countries associated with an increased risk of chronic morbidity and mortality. The population that is worst affected by long-term effects of anemia is children under age 5 years. As per the World Health Organization (WHO), prevalence of anemia in preschool-age children worldwide is around 50%. [2] Prevalence in India is even higher. According to National Family Health Survey 4 (NFHS 4) data, prevalence of anemia in children in the age group of 6–59 months had declined to around 60% from 79% in the NFHS 3 data. [3]

But a systematic analysis of global anemia burden from 1990 to 2010 revealed that children under the age of 5 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. [4]

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%.[5] In addition, most of the studies are limited to the infancy age group. [6] 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 South Indian, we conducted this current hospital-based study to have a better understanding of the actual burden.

MATERIALS AND METHODS

This is a Retrospective Study conducted in the Department of Pediatrics, Apollo Institute of Medical Sciences and Research among Children with Anemia and those Admitted with other Complaints but Incidentally have Found to have Anemia**.**

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

Inclusion Criteria

a) Children aged 6 months to 17 years
b) Hemoglobin level less than expected age- and gender-specific normal range.

Exclusion Criteria

a) Children with chronic illnesses or those having high grade fever >103oF
b) Those having systemic abnormalities
c) Children having other primary hematological disorders involving diseases of WBCs and Platelets.

Informed consent was obtained from the parents, and the Institutional Ethical Committee approved the study protocol. During physical examination following signs and symptoms were noted: Pallor, edema, clubbing, skin (dryness, rashes, irritation), abnormal pigmentation, coarse hair, puffiness of face, thinning of eyebrows, nail defects, ulceration, abnormalities in genitalia, hand and feet abnormalities, nose, eyes, cranium, ear and face.

Venous blood was drawn from all the patients and every sample was analyzed for hemoglobin (Hb) concentration, hematocrit (Hct), erythrocyte indices (mean corpuscular volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration), differential count, Erythrocyte sedimentation rate (ESR), Red cell distribution width (RDW), serum iron levels, total iron binding capacity, serum ferritin and serum vitamin B12 levels. Grading of anemia among different age groups was done using WHO Hemoglobin concentrations for the diagnosis of anemia and assessment of severity criteria. Microscopic evaluation of blood was also done to obtain the microscopic picture.

Statistical Analysis

For statistical evaluations, mean, standard deviation and Chi-square test were performed. p value less than 0.05 was considered to be statistically significant.

RESULTS

Table 1: Gender wise distribution of anaemic subjects

Gender	Number of cases	Percentage
Male	55	61.1%
Females	35	38.9%
Total	90	100

Table 2: Age wise distribution of anemia.

Age in years	Number of cases	Percentage
6 months to 1 year	22	61.1%
1 to 5	19	21.1
6 to 10	33	36.7

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

11 to 17	16	17.8
Total	90	100

Table 3: Prevalence of different types of anaemia.

Disease	Number of cases	Percentage
Iron deficiency anemia	55	61.1
Thalassemia	12	13.3
Megaloblastic anemia	8	8.9
Anemia of acute hemorrhage	5	5.6
Sickle cell anemia	11	12.2
Aplastic anemia	13	14.4
Leukemia	6	6.7

Table 4: Clinical profile of patients' anaemia.

Clinical signs and symptoms	Number of cases	Percentage
Pallor	82	91.1
Weakness and fatigability	71	78.8
Fever	49	54.4
Icterus	15	16.6
Shortness of breath	4	4.4
Hepatomegaly	9	10
Cough	11	12.2
History of pica	8	8.9
Splenomegaly	2	2.2
Petechiae	1	1.1
Vomiting	2	2.2
Koilonychia	3	3.3
Hyperpigmentation	2	2.2
Tremors	1	1.1

Table 5: Severity of anemias on the basis of hemoglobin

Grade of anaemia	Males	females	Total	%
Mild (Hb% >10 gm/dl)	25	15	40	44.4
Moderate (Hb% 7-10 gm/dl)	10	5	15	16.7
Severe (Hb% < 7 gm/dl)	30	5	35	38.9
Total	65	25	90	100

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

According to WHO criteria for diagnosis and assessment of severity of anemia, a total of 90 children were graded as having mild anemia 40 (44.4%), followed by 35 (38.9%) were graded as having severe anemia and remaining moderate anemia 15 (16.7%) in table 5.

Table 6: Distribution of the various morphological types of anaemia

Morphological variations	**Number of cases**	**Percentage**
Microcytic hypochromic anaemia	51	56.6
Normocytic hypochromic anaemia	17	18.8
Normocytic normochromic anaemia	11	12.2
Dimorphic anaemia	7	7.7
Macrocytic anaemia	4	4.4
Total	90	100

In table 6, microcytic hypochromic picture in 56%, Normocytic hypochromic anaemia 18.8%, normocytic normochromic in 12.2%, Dimorphic anaemia 7.7% and macrocytic in 4.4% cases.

Table 7 : Distribution of anaemias based on etiology

	Number of cases	**Percentage**
Iron deficiency anaemia	46	51.1
Anaemia of undetected etiology	26	28.8
Thalassemia major	11	12.2
Megaloblastic anaemia	4	4.4
Thalassemia trait	2	2.2
hereditary spherocytosis	1	1.1
Total	90	100

DISCUSSION

Pediatric anaemia 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 anaemia is a recognized public health problem worldwide. [7] In India, anaemia is the most common nutritional problem affecting more than half of the total population, particularly the children and the pregnant women. [8]

Iron deficiency anaemia 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 anaemia 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. [9]

Given the detrimental long-term effects and high prevalence of iron deficiency, its prevention in early childhood is an important public health issue. Patients with hemoglobinopathy syndromes

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

are commonly encountered in hematology clinics. Of these, the commonest disorder in India is thalassemia. [10]

The clinicopathological patterns, the morphological and the etiological types of anaemia as analyzed in the present study of 100 pediatric anaemia cases were compared with the other similar studies.

In the present study, more males were found to be anemic as compared to females (3:2). A similar gender distribution was noted in the study by Gomber. [11] Whereas, in a study conducted by Kapur et al. there was no difference in the gender distribution. [12]

In the present study, preschool children were maximally affected which is in concurrence with the study by Stellinga-Boelan. [13] 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%).

In our study, according to WHO criteria for diagnosis and assessment of severity of anemia, a total of 90 children were graded as having mild anemia 40 (44.4%), followed by 35 (38.9%) were graded as having severe anemia and remaining moderate anemia 15 (16.7%) in table 5.
In the present study, severe degree of anaemia was found in the maximum number of cases (48%), whereas, in a study by S. Jain moderate degree of anaemia (49.8%) was the most prevalent type. [14]

In our study, microcytic hypochromic picture in 56%, Normocytic hypochromic anaemia 18.8%, normocytic normochromic in 12.2%, Dimorphic anaemia 7.7% and macrocytic in 4.4% 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. [15] 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. [16]
The probable factors contributing to the prevalence of severe anaemia 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 anaemia 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.

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.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

CONCLUSION

Children being the most vulnerable group for nutritional deficiencies, require early screening for anaemias and associated illnesses. Initial screening and subsequent diagnostic tests enable early diagnosis and appropriate management. Utilisation of technologic advances is beneficial in arriving at a definite diagnosis. The basal blood parameters are mandatory before initiating treatment in pediatric anaemia cases. Thalassemias and other hemoglobinopathies impose financial, emotional and psychological stress on the patients and their families besides draining valuable resources of the country. Hence, screening for these diseases is mandatory. Use of prenatal diagnostic techniques and early detection of these disorders would ensure tremendous benefits and alleviation of suffering. In the present study, the preschool children were found to be the most affected. Hence, it is recommended that, this age group is compulsorily screened for anaemia.

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