

The Prevalence of Anaemia and Haematological Parameters in Children and Adolescents; A Hospital Based Study

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Article History

Received: 22.11.2022

Accepted: 27.12.2022

Published: 30.12.2022

Abstract: Introduction: Anemia is a common health problem worldwide. It is an important cause of morbidity and mortality of young and growing children in rural areas of developing countries. Young growing anemic children have various clinical symptoms including, pallor, Jaundice, fever, cough, breathlessness, hyper-pigmentation, tremors, and hepatosplenomegaly. **Aim of the Study:** Aim of the study was to evaluate the clinical manifestations, and grades of anaemia in different age groups. **Methods:** This retrospective observational study was conducted in the Department of Paediatrics at Dhaka Shishu Hospital, Dhaka, Bangladesh. A total of 95 patients were enrolled and analyzed in this study from July 2021 to December 2021. **Result:** In the present study of the prevalence of anemia and hematological parameters in children aged 1-18 years 10(10.53%) children were <1 year, 37(38.95%) were between 1-5 years, 28(29.47%) were aged between 6-10 years, and 11(11.58%) were between 11-15 years. Types of anemia were 46.32% had iron deficiency, 29(30.53%) had thalassemia. The clinical manifestation included 95 (100%) pallor, 79(83.16%) weakness and fatigability, 35(36.84%) fever, 25(26.32%) Icterus, 19(20.00%) shortness of breath, 17(17.80%) hepatomegaly. According to grade of anemia, 21.05% of patients had mild, 46.32% of patients had moderate anemia, and 32.63% had a severe grade of anemia. **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 the prevention and management of anemia in children assisted by public health services.

Keywords: Prevalence, Anaemia, Haematological Parameters, Adolescents.

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INTRODUCTION

Anemia has been a public health problem worldwide. The World Health Organization (WHO) reports that the prevalence of anemia is the highest in children (42.6%) and the lowest in non-pregnant women (29.0%) [1]. The 2013 National Health Survey in Indonesia showed that the prevalence of

anemia in children aged 1-4 years, 5-14 years, and 15-24 years were 28.1%, 26.4%, and 18.4%, respectively [2]. There was an increase in prevalence compared with that in the previous survey conducted in 2007, which was 27.7%, 9.4%, and 6.9% for children aged 1-4 years, 5-14 years, and 15-24 years, respectively [3]. In particular, the prevalence of anemia in school-aged children and

Citation: Hossain Sahid Kamrul Alam, Md. Aynal Hoque, Mohammed Rizwanul Ahsan, A.B.M. Mahfuj Hassan Al Mamun (2022). The Prevalence of Anaemia and Haematological Parameters in Children and Adolescents; A Hospital Based Study. *Glob Acad J Med Sci*; Vol-4, Iss-6 pp- 317-321.

adolescents almost tripled. The National Health Survey also showed that anemia prevalence is higher in the suburbs than in urban areas [2]. Iron deficiency (ID) is the most common micronutrient deficiency in the world and the most common cause of anemia [4, 5]. Studies on the prevalence of iron deficiency anemia (IDA) in Bangladesh are still scarce, and the result varies between studies, especially in school-aged children and adolescents. A study in 50 school-aged Indonesian children (6e12 years) found the prevalence of IDA to be 32% [6], while a retrospective study involving 709 laboratory records of Indonesian children and adolescents showed an IDA prevalence of 16% in the 5e11.9 years age group and 15.2% in the 12e18 years age group [7]. Indonesia is a low-to-middle-income country, with 10.6% of its population still living in poverty in 2017 [8]. Poverty is the root cause of most undernutrition, such as iron deficiency [9]. Children and adolescents with low-socioeconomic status are more susceptible to iron deficiency because of low iron intake and food low in bioavailable iron, which can be worsened by chronic blood loss due to parasitic infections and malaria [10]. Other factors such as chronic blood loss from menstruation and iron malabsorption from gastrointestinal problems can cause IDA in older children and adolescents [5, 11]. Few studies have been done in this field in Bangladesh showed that even the early stage of iron deficiency can affect motor and cognitive abilities and cause behavior disturbances in children that may be irreversible [10, 12, 13]. Iron deficiency anemia in adolescence also has a wide range of consequences, such as impaired physical and mental growth and development as well as reduced physical fitness, work capacity, and school performance [14]. The aim of the study was to evaluate the clinical manifestations, and grades of anemia in different age groups of children attending in a tertiary care hospital in Dhaka, Bangladesh.

METHODOLOGY & MATERIALS

This retrospective observational study was conducted in the Department of Paediatrics at Dhaka Shishu Hospital, Dhaka, Bangladesh. A total of 95 patients were enrolled and analyzed in this study from July 2021 to December 2021. The ethics committee of the hospital approved the study. Routine blood examination for anaemia was morphologically based on a peripheral smear (PS) findings of packed cell volume (PCV), Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH), Mean corpuscular haemoglobin Concentration (MCHC) and red cell distribution width (RDW) were determined by automated cell counter Haemoglobin was estimated by Sahil's method and expressed in gm%, PS (peripheral

smear) was stained by Leishman's stain. Reticulocyte count was done by the Brilliant crystal stain method; serum iron determination was done by Romany's bipyridyl method. Total iron binding capacity was determined by Ramsay's method, and serum vitamin B12 and folic acid were determined by the architect's method.

• Inclusion Criteria

Children between the age group of 1 year to 18 years with pallor clinically diagnosed as anaemia were selected for the study.

• Exclusion Criteria

Children more than 18 years and children with any critical conditions, congenital heart disease, immune-compromised, tuberculosis and hepatitis were excluded from the study.

All data were presented in a suitable table or graph according to their affinity. A description of each table and graph was given to understand them clearly. All statistical analysis was performed using the statistical package for social science (SPSS) program, and Windows. Continuous parameters were expressed as mean±SD and categorical parameters as frequency and percentage. Comparisons between groups (continuous parameters) were made by Student's t-test. Categorical parameters compared by Chi-Square test. The significance of the results by determining a value of P<0.05 was considered to be statistically significant.

RESULT

Age-wise distribution of paediatric patients is shown in table 1, where 10(10.53%) patients were aged <1 year, 37(38.95%) were between 1 to 5 years, 28(29.47%) were between 6 to 10 years, 11 (11.58%) patients were from the age group 11-15 years, and 9(9.47%) patients were aged between 16-18 years. Figure 1 shows the sex distribution of the study, 69% of patients were male, and 31% were female. According to the prevalence of different types of anemia, the majority of patients, 56(58.95%), had iron deficiency anemia, 29(30.53%) patients had thalassemia, 3(2.16%) patients had megaloblastic anemia, and only one patient had leukemia (Table 2). Clinical manifestations of Anemic patients 95(100%) had pallor, 79(83.16%) weakness and fatigability, 35(36.84%) fever, 25(26.32%) Icterus, 19(20%) shortness of breath, 17(17.89%) hepatomegaly, 13(13.68%) cough, 12(12.63%) History of pica, 12(12.63%) splenomegaly, 10(10.53%) petechiae, 9(9.47%) nausea/vomiting, 9(9.47%) koilonychia, 4(4.21%) hyperpigmentation, 5 (5.26%) tremors (Table 3). Figure 2 is shown the grades of anemia

based on hemoglobin level; 46.32% of patients suffered from moderate anemia, 32.63% of patients

suffered from severe anemia, and 21.05% of patients suffered from mild anemia.

Table 1: Age distribution of the study population (N=95)

Age range (Year)	Frequency	Percentage
<1	10	10.53
1-5	37	38.95
6-10	28	29.47
11-15	11	11.58
16-18	9	9.47
Total	95	100.00

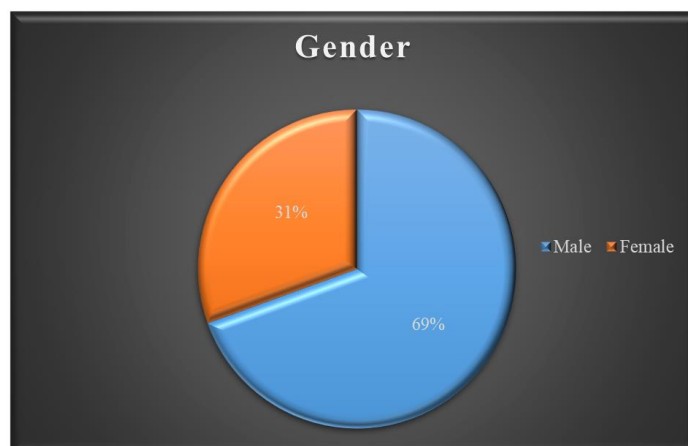


Figure 1: Sex distribution of the study population (N=95)

Table 2: Prevalence of different types of Anemia

Diseases	Frequency	Percentage
Iron deficiency Anemia	56	58.95
Thalassemia	29	30.53
Megaloblastic anemia	3	3.16
Anemia of acute hemorrhage	2	2.11
Sickle cell anemia	2	2.11
Aplastic anemia	2	2.11
Leukemia	1	1.05

Table 3: Clinical Manifestations in Anemia patients

Clinical Manifestations in Anemia patients	Frequency	Percentage
Pallor	95	100.00
Weakness and fatigability	79	83.16
Fever	35	36.84
Icterus	25	26.32
Shortness of breath	19	20.00
Hepatomegaly	17	17.89
Cough	13	13.68
History of pica	12	12.63
Splenomegaly	12	12.63
Petechiae	10	10.53
Nausea/Vomiting	9	9.47
Koilonychias	9	9.47
Hyperpigmentation	4	4.21
Tremors	5	5.26

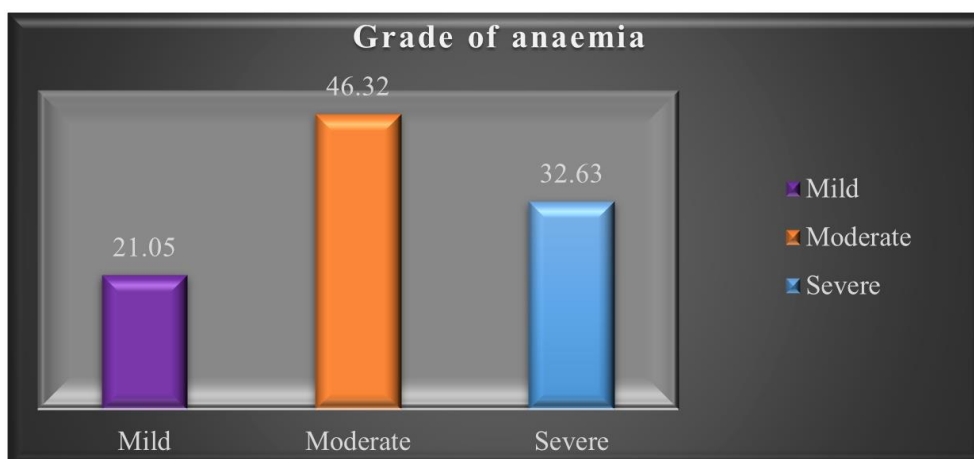


Figure 2: Grades percentage of Anaemia on the basis of haemoglobin level

DISCUSSION

In the present study of the prevalence of anemia and hematological parameters in children aged 1-18 years 10(10.53%) children were <1 year, 37(38.95%) were between 1-5 years, 28(29.47%) were aged between 6-10 years, and 11(11.58%) were between 11-15 years (Table-1). Types of anemia were 46.32% had iron deficiency, 29(30.53%) had thalassemia. The clinical manifestation included 95 (100%) pallor, 79(83.16%) weakness and fatigability, 35(36.84%) fever, 25(26.32%) Icterus, 19(20.00%) shortness of breath, 17(17.80%) hepatomegaly (Table-3). According to grade of anemia, 21.05% of patients had mild, 46.32% of patients had moderate anemia, and 32.63% had a severe grade of anemia. These findings are more or less in agreement with previous studies [15-17]. During the study of anemia in pediatric patients, including pertinent issues related to the history, physical examination, and initial laboratory investigations, Hematocrit (HCT) is the fractional volume of the whole blood sample occupied by RBC expressed as a percentage. For example, the normal HCT in children from 6 months to 12 years is approximately 40% and Hemoglobin in children of 6 months to 12 years is approximately 13.5 g/dL (135 g/L). Characterizing the symptoms helps to elucidate the severity and chronicity of anemia and may identify patients with blood loss or hemolytic etiologies. Common symptoms of anemia include lethargy, tachycardia, and pallor [18] which is also found in our study. Infants with anemia may present with irritability and poor oral intake. Changes in urine color, scleral Icterus, or jaundice may indicate the presence of hemolytic disorders, such as Thalassemia G6PD (glucose 6-phosphate dehydrogenase) deficiency. Bleeding from GIT (gastrointestinal tract) includes changes in stool color; identification of blood in stool and history of bleeding symptoms must be reviewed. Severe or chronic epistaxis also may result in anemia from

blood loss and iron deficiency. Previous medical history also plays a vital role in determining the cause of anemia in children, duration of gestational age at birth, hospitalization, and history of jaundice and anemia in the newborn period. Travel to/from areas of endemic infections (E.g. Malaria, hepatitis, tuberculosis) should also be ruled out to evaluate the cause of anemia. Moreover, herbal or oxidant drugs may cause hemolysis, particularly in patients with G6PD deficiency; possible environmental toxins exposure should be explored, including lead exposure, nitrates in well water, and family history of inherited hemolytic anemia [19]. Anemia with high absolute reticulocyte count (ARC) reflects an increased erythropoietin response for hemolysis or blood loss. Anemia with a low or normal ARC reflects deficient production of RBC (i.e., reduced bone marrow response to anemia). However, hemolysis or blood loss can be associated with the low concurrent disorder that impairs RBC production. In some cases, reticulocyte count depends on the phase of illness [20]. A review of PS (peripheral smear) is essential to anemia evaluation. Even if patients' RBC indices are normal review of the blood smear may reveal abnormal cells that can help to identify the cause of anemia. The diagnostic approach to anemia includes pancytopenia in leukemia and aplastic anemia, thrombocytopenia indicates hemolytic uremic syndrome and thrombocytosis in iron deficiency; leukocytosis or elevated WBC count includes leukemia and infections.

Limitations of the Study

Every hospital-based study has limitations, and the present study is no exception. The limitations of the present study are mentioned. Therefore, the present study's results may differ from the whole of the country or the world at large. The number of patients included in the present study was less than in other studies. Because the trial was short, it was difficult to remark on

complications and mortality. We have limited findings due to the tertiary location of the present institution, a limited number of patients, and a need for the latest (advanced) instruments.

CONCLUSION AND RECOMMENDATIONS

The present study of anemia in children below 12 years of age is mainly related to malnutrition. The prevalence of anaemia was higher in the lower age group due to frequent infections and lack of balanced diet. Girls of preschool age had probable iron, vitamin B12, or foliate deficiency, as indicated by high RDW values. Girls of adolescent age (11-12 years) required more nutritional support with the onset of puberty. Overall, children below 12 years boys were found to be suffering from a higher level of hypochromic and microcytic anemia. The present study recommends nutritional counseling to parents with low socioeconomic status and supplementation of iron and folic acid to the infants and adolescents at the onset of puberty.

Funding: No funding sources.

Conflict of Interest: None declared.

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