

ORIGINAL ARTICLE

Frequency of Anemia among Primary School Children Visiting the Paediatrics Outpatient Department of a Tertiary Care Hospital

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ABSTRACT

Background: In young children, Anemia is a common public health issue which significantly contribute in childhood morbidity and mortality. Anemia is associated with growth retardation, impaired cognition, decreased physical activity and contributor as a high national infant mortality rate.

Aim: To determine the frequency of anemia in school going children presenting to OPD of a tertiary care hospital.

Methods: A Cross Sectional Study conducted at Paediatric outpatient department of Sharif Medical City Lahore from 15.02.2018 to 14.08.2018. About 150 primary school children presenting to the Paediatric outpatient department of Sharif medical city Lahore for minor acute ailments and fulfilling the inclusion criteria were approached and an informed consent was taken from their parents before enrolling in the study.

Results: From 150 patients, it was observed that the minimum age was 5 years and maximum age was 11 years with mean and standard deviation of the age was 8.10 ± 1.89 years. The minimum hemoglobin level was found as 7.8 gm/dL and maximum hemoglobin level was 14 gm/dL with mean and standard deviation was 12.47 ± 1.62 gm/dL. The minimum body mass index was found as 10 kg/m^2 and maximum BMI was 20 kg/m^2 with mean and standard deviation was $15.52 \pm 2.91 \text{ kg/m}^2$. Presence of anemia was found in 14% patients while anemia was not found in 86% children.

Conclusion: Presence of anemia was found in 14% primary school children presenting to the outpatient department of a sharif medical city Lahore, tertiary care hospital. Effect modifiers showed significant association.

Keywords: Anemia, Hemoglobin Level, Body Mass Index, Socioeconomic Status.

INTRODUCTION

Anemia is described as decreased mass of red blood cell (RBC) or decreased level of hemoglobin. Anemia, in practice is usually described as reductions of single or of both of the following:

Level of hematocrit (HCT): When the of complete blood sample is occupied by red blood cells is defined as hematocrit, labeled as a percentage e.g., in six to twelve years children, normal hematocrit concentration is around 40%.

Hemoglobin (HGB): In whole blood the concentration of the RBC pigment hemoglobin, explained as Grams/100mL(dL) of complete blood. In 6 to 12 years old child normal hemoglobin value is approximately 13.5g/dL. Anemia is defined as hemoglobin or hematocrit which is 2 standard deviations below the mean for the given population. Normal hemoglobin and hematocrit considerably different with age. Thus, this is specifically necessary to consider the adjusted norms of anemic patient according sex and age. There is racial difference also, as compare to white children, black healthy children average hemoglobin values is 0.5g/dL below of the same age and sex¹. Fetal erythropoiesis begins with primitive megaloblastic erythropoiesis in the yolk sac at 4-5 weeks of gestation these cells can be identified². Hematopoiesis begins in the spleen, thymus, and lymph nodes

approximately the third month of gestation. Erythropoiesis reduced significantly after birth. This decrease is started by the high in tissue oxygen level that appears at birth and is associated with a decline in erythropoietin production^{2,3}. During second week after birth red blood cells production is low and increases gradually to maximum values around three months. The final outcome of these changes is a HB level that typically reaches a nadir at six to nine weeks of age (sometimes referred to as "physiologic anemia")^{4,5}. Children presenting with Red blood cell membrane abnormalities, like hereditary spherocytosis (HS), can develop anemia during the neonatal period because of the both decreased erythropoiesis that follows birth, the associated increase (normalization) in splenic filtration and phagocytosis⁶ and a shorter red cell life span. In children with anemia, ARC values within the normal range (less than $100 \times 10^9/\text{L}$) commonly show an inappropriately low erythropoietic response⁷. The reticulocyte indices (the corrected reticulocyte count and the reticulocyte production index) are occasionally used to correct for the degree of anemia. Bone marrow erythropoietic activity is indicated by absolute reticulocyte count (ARC). In children anemia with a normal or low absolute reticulocyte counts shows a suboptimal bone marrow response and is suggestive of marrow aplasia, malignant cells infiltration, suppression caused by infection or some toxic agents, or decreased production of erythropoietin⁸. As with the hemoglobin and hematocrit, normal values of MCV are different depend upon age. As compared to older children infants have an increased MCV. With decreasing gestational age MCV

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values increases, in a preterm 25 weeks of gestational age MCV will be 119fL compared to 106fL MCV value of term infant⁹. In children common causes of macrocytosis are certain drugs (eg, anti-convulsants, zidovudine and immunosuppressive agents)¹⁰. Other causes are including vitamin B12 deficiency or folic acid deficiency, hepatic disease, or aplastic anemia. As compared to mature cells, patients with large degrees of reticulocytosis may have increased MCV values compared to otherwise normocytic RBCs¹¹.

The MCHC is low in the same conditions that generate low values for MCV and MCH. The hyperchromia can be detected on the peripheral smear¹².

Red cell distribution width: The red cell distribution width is a quantitative measurement of the range of red blood cell sizes in the sample (anisocytosis). The red cell distribution width is a function of MCV and, therefore, normal ranges different slightly with age. However, normal values are usually between 12 and 14%¹³. Patients with iron deficiency anemia have RDW greater than 20, whereas patients with thalassemia or the anemia of chronic disease likely have normal RDW¹⁴.

The objective of this study is to determine the frequency of anemia in school going children presenting to the outpatient department of a tertiary care hospital.

MATERIALS AND METHODS

It was a cross sectional study conducted from 15.02.2018 to 14.08.2018 in Paediatric OPD of Sharif Medical City Lahore after permission from Ethical Committee. Sampling technique used was non probability consecutive sampling. Sample size of 150 cases is calculated with 95% confidence level, 5% margin of error and taking expected percentage of anemia in school children as 10.3%

Inclusion criteria:

- Age 5 to 11 years
- Both gender
- School going children attending outpatient department of a tertiary care hospital or routine checkup

Exclusion criteria:

- Children with chronic kidney disease i.e. GFR < 60 ml/min determined by MDRD equation.
- Children known to have thalassemia determined on history and medical record
- Children known to have acute leukemia determined on history and medical record
- Children with any chronic disease like chronic liver disease with history of illness for > 3 months.

About 150 primary school children presenting to the Paediatric outpatient department of Sharif medical city Lahore for minor acute ailments and fulfilling the inclusion criteria were approached and an informed consent was taken from their parents before enrolling in the study. Information regarding their demographic data was noted in the proforma. 5 ml of blood sample was taken from them using aseptic measure and was sent to the pathology laboratory in CBC vial for the assessment of haemoglobin levels. Data was entered and analyzed using SPSS version 21.0. Numerical variables i.e. age and Hb were summarized as mean and standard deviation. Qualitative variables like sex and presence of anemia were presented in the form of frequency and percentages. Data was

stratified for age, gender. Chi square test was applied to check statistical significance post-stratification. P-value ≤ 0.05 was used as statistically significant.

RESULTS

From 150 patients, it was observed that the minimum age was 5 years and maximum age was 11 years with mean and standard deviation of the age was 8.10 ± 1.89 years. The minimum hemoglobin level was found as 7.8gm/dL and maximum hemoglobin level was 14gm/dL with mean and standard deviation was 12.47 ± 1.62 gm/dL. There were 78(52%) male patients and 72(48%) were female patients. There were 32(21.3%) patients belong to lower class, 55(36.7%) patients belong to middle class and 63(42%) patients belong to high class. Presence of anemia was found in 21(14%) patients while anemia was not found in 129(86%) children. By using chi-square test it was found that presence of anemia was significantly associated with age group with p-value = 0.002. Significant association was not found between the presence of anemia and gender with p-value = 0.004.

Table.1 Descriptive Statistics (n = 150)

	Min.	Max.	Mean	Std. Deviation
Age	5	11	8.10	1.89
Hemoglobin Level	7.8	14	12.47	1.62
BMI	10	20	15.52	2.91

Table 2. Distribution of Gender

Gender	Frequency	Percent
Male	78	52%
Female	72	48%
Total	150	100.0

Table.3 Distribution of presence of anemia

Presence of Anemia	Frequency	Percent
Yes	21	14%
No	129	86 %
Total	150	100.0

Table 4: Stratification of Presence of Anemia With Respect to Age (n = 150)

Age	Presence of Anemia		Total
	Yes	No	
<8 Years	18	63	81
>8 Years	3	66	69
Total	21	129	150

P value 0.002

Chi-Square test applied.

Table 5: Stratification of presence of anemia with respect to gender (n=150)

Gender	Presence of Anemia		Total
	Yes	No	
Male	9	69	78
Female	12	60	72
Total	21	129	150

P value 0.366

Chi-Square test applied.

DISCUSSION

The objective of this research was to determine the frequency of anemia in school going children presenting in tertiary care hospital outpatient department. In this regard the present cross sectional study was conducted in Paediatric outpatient department of Sharif Medical City

Lahore. So one hundred and fifty cases were included by fulfilling the inclusion criteria by using non probability consecutive sampling. From 150 patients of cases, it was observed that the minimum age was 5 years and maximum age was 11 years with mean and standard deviation of the age was 8.10 ± 1.89 years. The minimum hemoglobin level was found as 7.8 gm/dL and maximum hemoglobin level was 14gm/dL with mean and standard deviation was 12.47 ± 1.62 gm/dL. The minimum body mass index was found as 10 kg/m² and maximum BMI was 20kg/m² with mean and standard deviation was 15.52 ± 2.91 kg/m². In a previous study, patients were aged between 6 years and 11 years. 627(57%) of them were boys, while the remaining 473(43%) were girls. 116(10.5%) of the students had anaemia as analyzed from their haemoglobin levels, which were below 11g/dl. 65(10.36%) of these were boys and the remaining 51(10.78%) were girls. On red blood cell morphology of the blood films, the commonest morphology of anaemia was microcytic (62.9%) and hypochromic (50%). This was followed by normocytic and normochromic (29.3%) morphology. Macrocytosis (10.3%), anisocytosis (15.5%), poikilocytosis (9.4%) and target cells (6%) were also noted. The study shows that anaemia, which is associated with many adverse effects, is fairly common in the school children of Lahore¹⁵. There were 52% male patients and 48% were female patients. Presence of anemia was found in 14% patients while anemia was not found in 86% children. In one previous study a total number of 319 children were included. Eighty-seven (27%) children were noted to be anemic. The Mean hemoglobin concentration (MHC) was 12.1gm/dl. There was no much difference between mean hemoglobin concentrations of males vs. female children. Anemia is a notable problem in our apparently healthy looking school going children of low to lower middle class¹⁶.

In another study, 537(54.91%) out of 978 specimens showed ova or cyst of gastrointestinal parasites. Out of 543 parasites isolated, *Ascaris lumbricoides* was the frequent parasite found in 193(35.54%) second common parasite isolated was *Giardia lamblia* 168(30.94%), third isolated parasite was *Entamoeba histolytica* in 59(10.87%), fourth parasite isolated was *Trichuris* in 46(8.47%) patients, *Ankylostoma duodenale* was found in 32(5.89%), In 31(5.71%) *Hymenolepis nana* isolated, *Enterobius vermicularis* was found in 11(2.02%) and in remaining 3(0.55%) *Taenia* species isolated. Anemia found in 37.01% students out of 978. Out of 362 children with anemia, intestinal parasites were found positive in 78.18%. In this study 63.70% were males and 36.30% were females out of 978 patients. They were further subdivided into two groups on the basis of age. Students between 5 to 10 years of age group were 64.72% and between 11 to 15 years age group were 35.28%. By using chi-square test it was found that presence of anemia was significantly associated with age group with p-value = 0.002. Significant association was not found between the presence of anemia and gender with p-value=0.004. In previous study Anemia prevalence according to (WHO) world health organization set cutoff

value of hemoglobin, in these children was 52.88%. Anemia frequency was significant higher in girls as compared to boys. Results of the study population revealed that Anemia positive children were 52.88%, 67.77% girls were 32.2% higher than boys (35.55%) it was also found that anemia positive children were under weight. It was suggested that periodically all children of school going age should be screened and proper steps should be taken¹⁸.

CONCLUSION

Presence of anemia was found in 14% primary school children presenting to the outpatient department of a tertiary care hospital. Effect modifiers like age, gender, socioeconomic status and BMI showed significant association.

Conflict of interest: Nil

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