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Original Research Article

Nutritional anaemia: clinical and haematological presentation in children

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ABSTRACT

Background: There are three main causes of anemia, decreased production of RBCs, and excessive destruction of RBCs or Excessive blood loss. In India, the main reason of anaemia is the decreased production due to nutritional deficiency. The main nutrients required in the process of haemoglobin production are iron, folic acid and cyanocobalamine. The objective of the present study was to find the clinical presentations and hematological changes in children with nutritional anaemia.
Methods: This Cross-sectional study was conducted from January 2018 to October 2018 in the department of Paediatrics of Ashwini Rural Medical College Hospital and Research Centre, Solapur. Children visiting the paediatric OPD due to any illness and having clinical suspicion of anemia were initially screened for inclusion in the study. Detailed laboratory investigation such as CBC, peripheral blood for Leishman's stain and reticulocyte count were performed. Serum Ferritin, vitamin B12, folic acid levels were also done to ascertain the cause of anemia. World Health Organization recommended criteria were used to diagnose and grade the anemia.
Results: A total of 405 anemic children were included in the study. Out of that 213 were boys and 192 were girls. A total of 226 children presented with mild anemia. The most common clinical presentation was respiratory tract infection, found in 62.22 % of children followed by fever in 53.09 % of children. Maximum numbers of patients were suffering from iron deficiency anemia, followed by folic acid deficiency. Deficiency of both of these nutrients was also common. Vit B12 deficiency was found in only 5 children.
Conclusions: The study concluded that iron deficiency anemia was the commonest nutritional anemia in children in the age group of 5 to 15 years. Second most common deficiency was of folic acid. Majority of the anemic patients presented with respiratory tract infection and fever.

Keywords: Anemia, Children, Iron deficiency, Nutritional anemia

INTRODUCTION

Anaemia is defined as reduction of RBC volume or Hemoglobin concentration below the range of values occurring in healthy persons.[1] There are three main causes of anemia, decreased production of RBCs, and excessive destruction of RBCs or Excessive blood loss. In India, the main reason of anaemia is the decreased production due to nutritional deficiency. The main nutrients required in the process of haemoglobin production are iron, folic acid and cyanocobalamine. The term "nutritional anaemia" includes anaemia due to one or more nutrients. Out of these nutrients, iron deficiency anaemia is most common. Folic acid deficiency is less common and occurs mainly with iron deficiency. Vitamin B12 deficiency is comparatively rare.[2] Nutritional

anaemia can lead to various physical and mental illnesses, thus contributing to the overall increased morbidity in children. It is a serious condition in pediatric age group, because the affected child is vulnerable to infections and can land in the vicious cycle of malnutrition-infection-malnutrition. It can also affect the overall mental and motor development of the child.[3-5]

In India about 70 million children i.e., 60%-70% of all children below 6 years suffer from varying degrees of anaemia.[6] As per the results of National Family Health Survey (NFHS) III, prevalence of anemia among children less than five years of age was around 69.5 %. Another study on prevalence of anaemia in India has showed that the prevalence of anaemia was 65 %, 60 %, 88 % and 85 % in infants and toddlers, 1-6 years of age, adolescent girls (3.3% had hemoglobin less than 7g/dl; severe anemia) and 85% pregnant women (9.9% having severe anemia) were anaemic.

This study was planned to find the clinical presentations and hematological changes in children with nutritional anaemia.

METHODS

This cross-section study was conducted in the department of Paediatrics of Ashwini Rural Medical College Hospital and Research Centre, Solapur from January 2018 to October 2018.

Children visiting the Paediatric OPD due to any illness and having clinical suspicion of anemia were initially screened for inclusion in the study. Detailed laboratory investigation such as CBC, peripheral blood for leishman's stain and reticulocyte count were performed. Serum Ferritin, vitamin B12, folic acid levels were also done to ascertain the cause of anemia. In some cases bone marrow examination was done for the same.

Inclusion criteria

- Children in the age group of 5 to 15 years.
- Children suffering from anaemia due to any of the nutritional deficiency.

Exclusion criteria

- Anaemia due to excessive blood loss, haemolytic anemia, malignancy
- Any other cause of anaemia apart from nutritional anaemia.

Following World Health Organization criteria was used to diagnose and grade the anemia.[7]

Anemia in children of age 12 to 15 years

Hemoglobin <12 gm/dl.

Grading of anemia

- Mild: Hemoglobin concentration-11gm/dl to 11.9gm/dl
- Moderate: Hemoglobin concentration-8gm/dl to 10.9gm/dl
- Severe: Hemoglobin-<8gm/dl.

Anemia in children of age 5 to 11 years

Hemoglobin <11.5gm/dl

Grading of anemia

- Mild: Hemoglobin concentration-11gm/dl to 11.4gm/dl
- Moderate: Hemoglobin concentration-8gm/dl to 10.9gm/dl
- Severe: Hemoglobin-<8gm/dl.

Detailed clinical history of the included patients was noted on a predetermined proforma. Haemotological profile was also recorded in the proforma. Grades of the anemia were determined as per the hemoglobin concentrations, specific for the age of the patient. Analysis of the data was done using SPSS 17.

RESULTS

A total of 426 patients were initially screened for inclusion in the study. After detailed laboratory investigations 405 patients were included in the study, after exclusion due to any of the exclusion criteria. Out of 405 patients, 213 were boys and 192 were girls. The maximum patients were in the group of 5 to 6 years of age. The next common age group was 6-7 years (Table 1).

Table 1: Age and gender wise distribution of anemic children included in the study.

Age group	Male		Female		Total	
5-6	30	14.08	29	15.10	59	14.57
6-7	27	12.68	23	11.98	50	12.35
7-8	22	10.33	18	9.38	40	9.88
8-9	26	12.21	21	10.94	47	11.60
9-10	23	10.80	18	9.38	41	10.12
11-12	22	10.33	16	8.33	38	9.38
13-14	20	9.39	15	7.81	35	8.64
14-15	15	7.04	11	5.73	26	6.42
Total	213		192		405	

Table 1 also shows that boys were more affected than girls.

The grading of anemia was done using the criteria mentioned in the methods, for that specific age. Out of a total of 405 anemic children, 226 were presented with

mild anemia A total of 156 (38.52 %) suffered from moderate degree of anemia and only 23 (5.68 %) had severe anemia (Table 2).

Table 2: Classification of anemia.

Grade of anemia	Number	Percentage
Mild	226	55.80
Moderate	156	38.52
Sever	23	5.68
Total	405	100

The most common clinical presentation was respiratory tract infection, found in 62.22 % of children followed by fever in 53.09 % of children. Other clinical presentations were spenomegaly (20.99 %), hepatomegaly (12.84 %), pain in abdomen (12.10 %) (Table 3).

Table 3: Clinical presentation of cases.

Clinical presentation	Number	Percentage
Respiratory tract infection	252	62.22
Fever	215	53.09
Splenomegaly	85	20.99
Hepatoegaly	52	12.84
Pain in abdomen	49	12.10
Malnutrition	46	11.36
Diarrhoea	29	7.16
Icterus	27	6.67
UTI	16	3.95
Petechial hemorrhages	15	3.70

Maximum numbers of patients were suffering from iron deficiency anemia, followed by folic acid deficiency. Deficiency of both of these nutrients was also common. Vit B12 deficiency was found in only 5 children. (Table 4).

Table 4: Nutritional deficiency status in the children.

Deficiency	Number	Percentage
Iron	385	95.06
Folic acid	125	30.86
Vit B12	5	1.23

DISCUSSION

The present study was planned the department of Paediatrics, Ashwini rural medical college hospital and research centre, Kumbhari. In this study a total of 405 children suffering from nutritional anemia were included and their clinical and haematological presentations were studied.

The study has revealed that majority of the patients were in the age of 5 to 6 years, and majority were males. However, being a hospital-based study conducted in patients visiting paediatrics OPD for any illness, the study cannot comment on the overall prevalence of anaemia in different age groups and gender.

Other studies conducted by Madoori et al and Saroja CN et al, has also reported that the majority of anemic patients were boys.[8,9] A study by Janjale et al has reported that the maximum anemic children were in the age group of 0.5 to 3.5.[10] However the inclusion criteria were different for that study, resulting in the differences in the study findings. Also, the differences in the socio-demographic profile of the study population, their inclusion criteria could have resulted in different findings.

This study has revealed that about 55.80 % of anemic children has mild grade of anemia. The commonest clinical presentation in this study was respiratory tract infection followed by fever. Other studies conducted by Madoori et al and Janjale et al had also reported comparable findings.[8,10] The study has reported that majority of the anemic were suffering from iron deficiency. About 46 children were malnourished. Mixed deficiency of iron and folic acid was also seen in many patients. The findings are comparable with the findings of Kotecha PV, who has reported that the nutritional anemia is commonest cause of anemia and iron deficiency is the commonest form nutritional deficiency.[2]

The study is a hospital-based study, conducted in pediatric patients visiting OPD for any illness. So, the most important limitation of the study is that, it cannot calculate the overall prevalence of anemia in the community. The findings are limited to the pediatric patients visiting OPD for any illness and should not be generalized.

CONCLUSION

The study concluded that nutritional anemia was the commonest of anemia in children in the age group of 5 to 15 years. Majority of anemic were suffering from iron deficiency and / or folic acid deficiency. Majority of the anemic patients presented with respiratory tract infection and fever.

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