



RESEARCH ARTICLE

A STUDY OF ANEMIA IN HOSPITALIZED CHILDREN IN A TERTIARY CARE HOSPITAL IN NORTHERN INDIAAmieleena Chhabra*¹, Vipin Chandar², Amit Singh³, Alpa Gupta⁴, Harish Chandra⁵, Sandeep Gaur⁶¹Senior Resident, Department of Pediatrics, Dr Ram Manohar Lohia Hospital & PGIMER, New Delhi, India²Professor and HOD, Department of Pediatrics, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun, Uttarakhand, India³Assistant Professor, Department of Pediatrics, Govt. Medical College and Hospital, Haldwani, Uttarakhand, India⁴Associate Professor, Department of Pediatrics, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun, Uttarakhand, India⁵Associate Professor, Department of Pathology, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun, Uttarakhand, India⁶Lecturer, Department of Pharmacology, Govt. Medical College and Hospital, Haldwani, Uttarakhand, India

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ABSTRACT

The aim was to find out the etiology of anemia in hospitalized children. It was a prospective study in tertiary care hospital, dehradun (Uttarakhand) india. One hundred eighteen (118) children between 6 months -14 years of age were studied for anemia. 64.4% were boys and 36.5% were girls. 51% were less than 5 years of age. Mild, moderate and severe anemia was seen in 10.1%, 35.5% and 54.2% cases respectively. Nutritional anemia was most frequent with Iron deficiency in 55% and Megaloblastic in 9.3%. Other causes were malignancies (16%), chronic disorders (9.3%). Thalassemia major (3.3%) and Bleeding disorders (2.5%). All cases presenting with PICA and chronic diarrhea had Iron deficiency anemia ($p < 0.01$). Pallor was present in 100% cases. Megaloblastic anemia was found to be common in older age group. 51% had malnutrition and majority belonged to Low socioeconomic status. The study highlights the etiology of anemia in hospitalized children. The incidence of nutritional anemia was maximum. Megaloblastic anemia was found in older age group and the incidence of Thalassemia was low.

Key words: Anemia, Children, Nutritional anemia.**INTRODUCTION:**

Anemia in children is an important health problem in almost all the developing countries of the world with an estimated prevalence of 43 %^[1]. Anemia has a variable impact on physical development and children show poor attentiveness, memory and academic performance^[2-4].

Majority of anemia cases are nutritional and invariably a common accompanying feature of almost all cases of protein energy malnutrition (PEM). Manchanda et al observed 100% incidence of anemia in PEM^[5]

Nutritional anemia is more common in low socioeconomic status groups due to features like maternal ill health, under nutrition, faulty feeding knowledge with inadequate feeding provisions^[6]

Himalayan Institute Hospital, a tertiary care hospital of Uttarakhand looks after cases from two adjacent states (inpatient as well as outpatient). Anemia in children is often a cause of admission, hence this study was

undertaken to know the etiology of Anemia in children admitted to this hospital.

MATERIALS AND METHODS:

The study was carried out in the Department of Pediatrics, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun over a period of one year.

A total of 1355 cases were admitted for various diseases. 118 cases between the age group of 6 mo-14 years were found to have anemia. Detailed history included dietary intake, ingestion of any drugs, worm infestations, loss of blood and duration of onset of anemia. Protein energy malnutrition was graded by IAP classification and Socio-economic status by modified B.J Prasad classification. Investigations included hemoglobin levels, total and differential leucocyte counts, Red blood indices (MCV, MCH, MCHC), blood picture, reticulocyte counts, Bone marrow examination, hemoglobin electrophoresis, Serum Iron, S Ferritin, TIBC, B12 and Folic acid levels, Stool examination for ova and occult

blood. Grading of anemia was done according to WHO Criteria. (1).Statistical analysis was done using Chi square test and Non parametric test of variance using SPSS 10 and Epi info softwares.

RESULTS

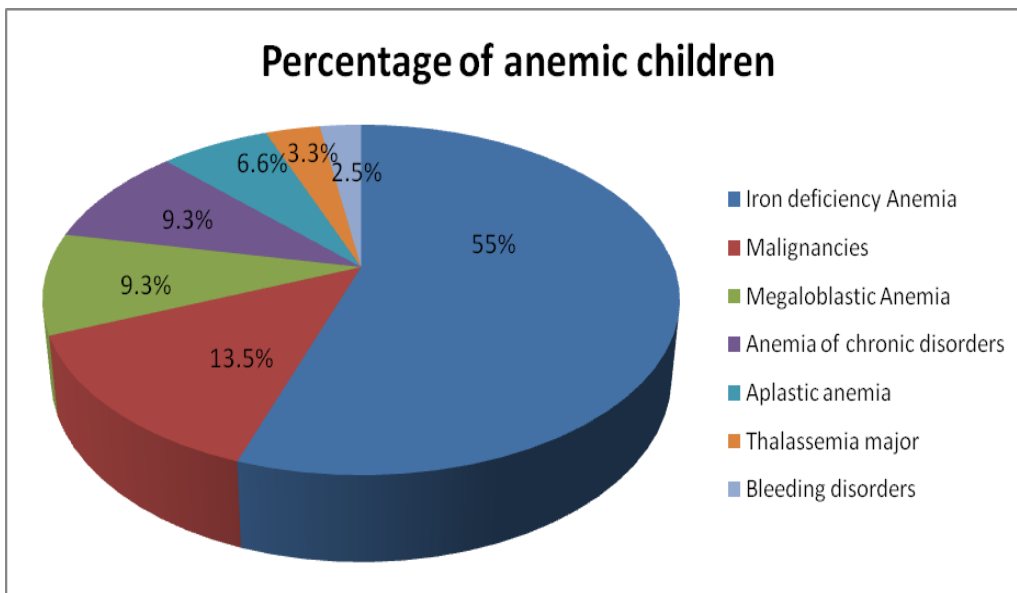
There were 1355 pediatric admissions in the hospital.118 cases were of anemia of various etiologies constituting 9% of total hospital admissions. There were 64.4% males and 36.5% females. Mean age of males was 6.68 ± 5.1

and that of females was 7.59 ± 5. Maximum number of cases (51%) belonged to younger age group (less than 5 years) as compared to older age group (6-14 years). Male to female ratio was 1.8:1. Male preponderance was noted in all the age group; however not statistically significant (P > 0.05). Mild anemia was present in 12(10.1%) moderate in 42 (35.5%) and severe in 64 (54.2%) cases.

Table 1: The main causes of anemia

Type of Anemia	Number
Iron deficiency Anemia	65
Malignancies	16
Megaloblastic Anemia	11
Anemia of chronic disorders	11
Aplastic anemia	8
Thalassemia major	4
Bleeding disorders	3
Total	118

Figure 1: Percentage type of anemia in children



Nutritional anemia was the leading cause 76 (64.4%) with Iron deficiency in 65 (55%) and megaloblastic in 11 (9.3%).Other causes included Malignancies in 16 (13.5%) Anemia of chronic disorders in 11 (9.3%),Aplastic anemia in 8 (6.6%), and Thalassemia in 4 (3.3%).Among nutritional anemia 47 (61%) were below 5 yrs and rest 29 (38%) were between 6-14 years. Iron deficiency anemia was more common in younger age group i.e. 86.3% in 6 months – 1 year of age. Megaloblastic anemia and malignancies were common in older children 21.9% and

24.3% respectively in 11 – 14 years of age. Fever was the commonest presenting complaint (77.9%); present in all cases of malignancies (100%). All cases presenting with complaints of Pica had iron deficiency anemia and was statistically significant (p< 0.01).Fatigue and lethargy was more common in older age group, was present in almost all types of anemia and was statistically significant (p<0.001). All cases of chronic diarrhea had iron deficiency anemia, Pallor was found in all the cases (100%).Hepatomegaly was found in 58.4% and

Splenomegaly in 37.2% and were more common in older age. Icterus was seen in 45.4% cases of megaloblastic and was statistically significant ($p < 0.001$). Lymphadenopathy was in 68.7% cases of malignancies and was statistically significant ($p < 0.001$).

Microcytic hypochromic picture was common in all the age groups and was significantly associated with iron deficiency anemia. Pancytopenia was present in 11 % of cases and was most common in aplastic anemia (75%) followed by in megaloblastic anemia (36.3%). Macrocytic picture and Pancytopenia was common in older age group 11- 14 yrs. Mean cell volume was low in 95.3% cases of iron deficiency and high in 81.8% cases of megaloblastic anemia. In iron deficiency anemia S. Iron $< 45 \mu\text{g}/\text{dl}$ and TIBC $> 385 \mu\text{g}/\text{dl}$ was seen in 96.9% and 95.3% cases respectively and was statistically significant ($p < 0.001$) High MCV, MCH and MCHC were significantly associated with megaloblastic anemia ($p < 0.001$). Malnutrition was seen in 51.6% of anemic children and association was statistically significant ($p < 0.01$). Developmental delay was present in 7.6% cases of nutritional anemia. Low socioeconomic class contributes significantly to anemia and most of the children belonged to class III and IV socioeconomic class i.e. 66.1% and 26.2% respectively. In our study MCV $< 80 \text{fl}$, MCHC $< 32 \text{g}/\text{l}$, S. iron $< 45 \mu\text{g}/\text{dl}$, TIBC $> 385 \mu\text{g}/\text{dl}$ and S. ferritin $< 7 \text{ng}/\text{ml}$ S B12 $< 200 \text{pg}/\text{ml}$ and Folate $< 5 \text{nmol}/\text{l}$ were significantly associated with nutritional anemia ($p < 0.01$).

DISCUSSION & CONCLUSION:

In our study males outnumbered females in all the age groups. Similar results were also obtained in another hospital based study.^[7]

Male predominance in our study could be due to social patterns in our society as males get more attention in Indian families resulting in higher admission rate.

The prevalence of anemia in children in developing countries is most commonly nutritional, related to dietary deficiency of iron, vitamin B12 and folic acid. Usually anemia is mild and may be undetected but many times it can be severe with varied manifestations and requiring hospitalization.

Nutritional anemia was the main cause of severe anemia in our patients, infants as well as older children. The predominance of iron deficiency with folate and vit B12 playing a secondary but significant role is similar to previous studies in other developing countries.^[7,8,9]

Nutritional megaloblastic anemia occurs commonly in undernourished and malnourished children; the commonest age is 3-18 months with maximum number of cases being between 9-12 months.^[10] These children are generally exclusively breast fed by mothers who are

undernourished and have poor cobalamine and folate levels. In variance to this all cases of megaloblastic anemia in our study were in the older age group and females outnumbered males. In addition to the low levels of B12 and folic acid, macrocytic picture on peripheral blood smear and pancytopenia were common in these children. This could be because of nutritional deficiency prevalent in children of lower economic class and social taboos associated with the female child.

Recently it has been demonstrated that iron deficiency anemia causes low Infant behavior record (IBR) manifesting as unhappiness, lack of cooperation and short attention span and also lower mental developmental index (MDI). Even minimal iron deficiency causes low MDI. Both IBR and MDI revert to normal following correction of iron deficiency^[11]. In our study all cases having developmental delay had iron deficiency. This can also be attributed to poor feeding patterns in these children leading to nutritional deficiencies.

Our study also reflects that, there is significant association of anemia with protein energy malnutrition $p = < 0.01$ and most of them belonged to grade II, III, and IV. This shows direct relationship between malnutrition and anemia in children. Similar results have been seen in other studies.^[7,12,13] The exact pathogenesis of anemia in PEM continues to be conjectural. Besides the deficiency of nutrients, infections are another important cause of anemia in PEM since many of these children suffer from acute and often repeated episodes of a variety of infections. Various postulates put forward to explain anemia in chronic infections are (i) increase in the requirement of nutrients. (ii) decreased iron absorption from the gut. (iii) erythroid hypoplasia.^[14,15]

The incidence of Thalassemia major in admitted cases in our study was (3.3%). However studies done by ICMR from other states specially Delhi has shown prevalence of beta thalassemia trait varying from 2.4 to 7.6%, being the highest (7.6%) among the children from Punjab^[18]. It was interesting to note the higher frequency of beta thalassemia trait in children from schools in the west and North of Delhi (5.8-9.2%), where the population is mainly of Punjab origin compared to the children from south (2.2-2.3%) of the city. Also the overall incidence in Delhi (5.47%) was much higher in comparison to that seen in children in Mumbai (2.6%)^[19]. Another study by Balgir showed a prevalence of 18.2%.^[20]

Malignancies as a cause of anemia contributed significantly in our study. It was again more common in the older age group.

Majority of children in our study belonged to class III and IV socioeconomic status. Similar results were seen in studies by Goel et al, Aung Than et al and Rao et al^[7,9,21].

To the best of our knowledge, this is first hospital based study covering patients from three neighboring states of Uttrakhand, UP and Himachal Pradesh and to substantiate our findings of megaloblastic anemia in older children and low incidence of Thalassemia major require further studies.

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