

## CLINICO- HEMATOLOGICAL PROFILE OF CHILDREN WITH ANEMIA AT TERTIARY CARE HOSPITAL, GUNTUR, ANDHRA PRADESH

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### Abstract

**Background:** Anaemia is a major public health problem encountered in developing countries like India, because of the prevailing malnutrition and endemicity of a wide range of infections in our country. Anaemia i.e., Hb<11gm/dl is associated with negative effects on the physical growth and cognitive development of the child from the period of infancy up to Adolescence and also anaemia is associated with increased morbidity. Hence, the present study is undertaken to know the various aetiologies associated with Anaemias, their clinical presentations, their age and sex distribution, so that adequate curative as well as preventive measures could be followed so as to decrease the incidence as well as prevalence of anaemia in children. **Materials and Methods:** 100 children with Hb less than 11 gm/dl were studied; detailed clinical examination and all the relevant laboratory investigations were done. The children are categorised according to their age, sex, associated diseases, RBC indices, peripheral smear, iron studies and other relevant investigations tailored as per requirement. **Result:** In this study; Anaemia was more common in the age group of 4–7 years (38%) followed by 1–3 years (36%); with a male preponderance, males were (54%); females were (46%); majority of the children (70%) were malnourished with varying degrees of malnutrition. The most common cause of anaemia in this age group was due to nutritional deficiency (66%) of which 62% of the cases were due to iron deficiency anaemia; 4% of the cases were of megaloblastic anaemia; followed by haemolytic anaemias (32%); of which 10% of the cases were thalassemia; 8% of the cases were sickle cell anaemia; 8% of the cases were due to dengue; and 6% of the cases were due to malaria.

## INTRODUCTION

Anemia is a major public health problem all over the world especially in developing countries. Anemia is one of the most important disorders of blood in infancy and early childhood. These result in significant morbidity and mortality in children and constitute a public health problem of considerable importance.<sup>[1]</sup> Infants, under 5-year-old children, and pregnant women have greater susceptibility to anemia because of their increased iron requirements due to rapid body growth and expansion of red blood cells. Anemia prevalence in young children continues to remain over 70% in most parts of India and Asia despite a policy being in place and a program that has been initiated for a long time.<sup>[2]</sup> Out of all the causes, like nutritional anemia, Hemolytic anemia's, chronic infections,

lymphoreticular malignancy, etc., nutritional anemia's account for the major cause of anemias. Approximately 50% of anemia cases are caused by iron deficiency.<sup>[3]</sup> Anemia is a critical health concern because it affects growth and energy levels adversely. It damages immune mechanisms and is also associated with increased morbidity.<sup>[4]</sup> Anemia in children results in impaired cognitive performance, behavioral and language development and scholastic achievement. Lack of awareness among the mothers about the problem coupled with their low educational status, poor nutritional practices and unhealthy food habits, low iron bioavailability of the diet, decreased physical activities, malaria and parasitic infestations are additional factors associated with lower hemoglobin (Hb) level in children.

## MATERIALS AND METHODS

This is a hospital based observational cross-sectional study conducted in Katuri Medical college, Guntur, Andhra Pradesh between. 1-12 years of age children admitted in the pediatric ward with various complaints were evaluated for anemia. All the patients with hemoglobin <11mg/dl according to WHO cut off were included in the study.

### Inclusion criteria:

Patients with anemia in the age group of 1-12 years admitted in pediatric ward of Katuri Medical College during the study period were included in the study

### Exclusion criteria:

Patients having serious illness, patients with acute blood loss due to trauma and patients who have received blood transfusion within last 4 weeks are excluded from the study.

Socio demographic data was collected using pre tested questionnaire. Anthropometric measurements like height and weight of patients were noted. General examination and systemic examination were done.

Blood tests: Complete blood picture: including hemoglobin, hematocrit, RBC count, total leukocyte count, differential counts, platelets count, RBC indices were done. Other tests include TLC, CRP, peripheral smear and stool examination for ova or worm infestations and occult blood was done

The collected data was spread on Microsoft excel and analyzed using SPSS version 20.0.1. data was summarized as mean and standard deviation for numerical variables and count and percentages for categorical data. Chi square test was applied Z test was used to test the significant difference.

## RESULTS

Among the 412-pediatrics admitted in Katuri Medical college during the study period anemia was observed in 102 patients, as defined by WHO, admitted in the pediatric ward from the period from September 2021 to march 2022, 100 were included in the study. 2 patients were excluded as one child had recent blood transfusion and another patient was having blood loss due to trauma. Data was collected from 100 children aged between 1-12 years The mean age was 3.24 years±5.54. Table 2 shows the gender distribution, 54 boys and 46 girls were in the study population.

**Table 1: Distribution according to age**

Age	Frequency	Percentage
1 – 3	18	36%
4 -7	19	38%
8 -12	13	26%
Total	50	100%
Mean ± SD	5.54 ± 3.24	

**Table 2: Gender distribution**

Gender	Frequency	Percentage
Male	54	54%
Female	46	46%
Total	100	100%

**Table 3: Symptoms observed in children**

Symptoms	Frequency	Percentage
Icterus	6	6%
Edema	6	6%
Pallor	36	36%
Seizures	8	8%
Palpitation	6	6%
Easy fatigability	56	56.0%
Generalized weakness	26	26.0%
Irritability	26	26.0%
Lethargy	14	14.0%
PICA	22	22%
Chills	2	2%
Bleeding	2	2%
Growth retardation	4	4%
Rash	2	2%
Weight Loss	4	4%

[Table 3] presents the common symptoms observed, majority (56%) had easy fatigability, followed by pallor in 36%, generalized weakness and irritability is observed in 20% each 22% had PICA. Other symptoms were lethargy 14%, Seizures 8% and Icterus, edema and palpitations each 6%.

**Table 4: Signs observed**

Signs	Frequency	Percentage
Altered sensorium	2	2%
Ejection Systolic Murmur	18	18%
Haemic murmur	2	2%
Hepatomegaly	18	18%
Hepatosplenomegaly	14	14%
Splenomegaly	12	12%
Tachycardia	96	96%
Tachypnea	66	66%
Bone pain	6	6%
Chills	2	2%
Frontal bossing	8	8%
Koilonychia	8	8%
Petechia	2	2%
Rash	6	6%

[Table 4] shows the signs observed, Cardiovascular symptoms like tachycardia (96%) ejection systolic murmur (18%) and hemic murmur (2%) were seen. Organomegaly like hepatomegaly is seen in 18%, splenomegaly in 12% and hepatosplenomegaly is observed in 14%. Other general signs include, Koilonychia (8%), rash (6%), bone pain (6%) and petechia (2%) were observed.

**Table 5: Distribution of hemoglobin levels in various Socio - economic Status**

Socio - economic Status	3-5g/dl	6-8g/dl	9-11g/dl
I	0	6	4
II	4	2	8
III	2	12	8
IV	6	14	10
V	2	10	12

**Table 6: Distribution of Hemoglobin with different age group**

Age	Hb% 3-5g/dl	Hb%6-8g/dl	Hb%9-11g/dl
1-3 years	1	15	20
4-7 years	10	16	12
8-12 years	4	12	10

[Table 6] shows the hemoglobin status with different age groups Chi-square static is 9.5488 and p-value is 0.487, so there is significant difference between hemoglobin status with age of the children.

**Table 7: Distribution of complete blood picture parameters**

RBC count	Normal	High	Low
MCH	2%	4%	94%
MCV	12%	4%	84%
MCHC	44%	0%	56%
RDW	48%	50%	2%
TLC	48%	46%	6%
PLATETS	82%	10%	8%

**Table 8: Peripheral Smear Appearance.**

Peripheral Smear Appearance	Percentage
Macrocytic	4%
Normocytic normochromic	20%
Normocytic hypochromic	24%
Microcytic hypochromic	52%
Sickling	6%
Peripheral smear for Malaria	4%

**Table 9: Distribution of Serum Ferritin**

Distribution of Serum Ferritin	Frequency	Percentage
<15	52	52%
>15	10	10%
Normal	12	12%

**Table 10: Distribution of Type of Anemia**

Type of Anemia	Frequency	Percentage
Aplastic	2	2%
Dengue	8	8%
Iron deficiency anemia	62	62%
Malaria	6	6%
Megaloblastic anemia	4	4%
Sickle cell anemia	6	6%
Sickle thalassaemia	2	2%
β thal minor	4	4%
β thal Major	6	6%
Total	100	100%

**Table 12: Distribution of Associated diseases**

Distribution of Associated diseases	Frequency	Percentage
Bronchial asthma	4	4.00%
Bronchopneumonia	38	38.00%
Bronchiolitis	6	6.00%
Dengue	8	8.00%
Empyema	2	2.00%
Gastroenteritis	16	16.00%
Hyper IgE syndrome	2	2.00%
Malaria	6	6.00%
PTB	4	4.00%
Pyogenic meningitis	2	2.00%
Sepsis	2	2.00%
UTI	4	4.00%
Viral Hepatitis	6	6.00%
Total	100	100.00%

[Table 7] shows the distribution of blood parameters red cell indices and distribution of other blood cells. Most of the Red cell indices like MCH (94%), MCV (84%), MCHC (56%) are low. 46% were having high TLC, in 82% were having normal platelet counts.

[Table 8] presents the peripheral smear appearance of RBC. Majority 52% were having microcytic and hypochromic appearance, normocytic hypochromic in 24%, normocytic and normochromic in 20% and macrocytic appearance in 4%. Sickling was observed in 6% and 4% were having malaria parasite.

## DISCUSSION

Anemia is a major public health problem involving both developed as well as developing countries, affecting the human health, and economy of the country.

According to WHO health Observatory, there are 62,365 thousand of children suffering from anemia.<sup>[5]</sup>

According to the NFHS 5 statistics, there is an increase in the of anemia from 58.6% in 2015 - 2016 to 65% in 2019 - 2020 in Andhra Pradesh.<sup>[6]</sup>

The present study is done at Katuri medical College, located in the outskirts of Guntur city; and according to NFHS-5 survey, the current prevalence of anemia is 59.3% in Guntur in the year 2019 to 2020, and the prevalence has reduced when compared to NFHS -4 surveys done in the year 2015 - 2016 where it was 68.6%.<sup>[6]</sup>

Anemia is an important problem in almost all of the developing countries with an average prevalence of 43%.<sup>[7]</sup>

WHO shows that an estimated 1.62 billion people are anemic all over the world; with high prevalence of 47.4% in the preschool group of children; which formed an estimate of 293 million; of which 89 million children are from India.<sup>[8]</sup>

Anemia has impact on the scholastic performance and also physical and mental development; Mostly anemia is due to nutritional deficiencies and on an average 50% of the cases of anemia are due to iron deficiency.<sup>[9]</sup>

Globally, iron deficiency anemia has a prevalence of 47.4% and 25.4% in the preschool age and school-age children.<sup>[8]</sup>

### Age:

In the present study, the mean age was 5.54 ±3.24years; 36% of the cases belong to 1- 3 years; 38% of the cases are in between 4 - 7 years and 26% of the cases are in between 8 - 12 years; in the study conducted by Uria GA et al.,<sup>125</sup> they have observed that the majority of the children were under five years of age especially between 1 - 2 years and this finding was in concordance with the present study.

Similar results have been seen in studies done by Pramila Ramawat et al,<sup>[10]</sup> and Faraz Ahmad Khan

et al.,<sup>11</sup> where the most common age group affected is less than five years of age.

In the study conducted by Pramila Ramawat et al,<sup>[10]</sup> 8.4% of the children were under the age group of 6 months, 30.2% of the children were under the age group 6 months to one year; 40.7% of children were between 1- 5 years, 13.2% of children between 5-10 years and 8% of children between 10-14 years.

In the study conducted by Faraz Ahmad Khan et al,<sup>[11]</sup> 37% of the cases were in the age groups 6months to 2 years, 34% of the cases between 2-4 years and 29% of the cases between 4 – 5 years.

Infections, malnutrition and presence of hereditary factors in this particular age group can contribute to the observations that have been made.

#### **Sex distribution:**

In the present study, 54% were male and 46% were female; A slight male preponderance was observed in this study; which was in concordance with Pramila Ramawat et al,<sup>[10]</sup> and Faraz Ahmad Khan et al,<sup>[11]</sup> and it was opined that male children were found to be notified more at the health centers due to various health issues.

In the study conducted by Pramila Ramawat et al,<sup>[10]</sup> 51.3% were boys and 48.6% were girls; and in the study done by Faraz Ahmad Khan et al,<sup>[11]</sup> 55% of the cases were males and 45% of the cases were females. This study is also in concordance to the study conducted by Saba F et al., who have shown a male: female ratio of 1.4:1.

#### **Fever:**

In the present study, 90% of the cases were having fever; this might be due to the fact that children are brought to seek medical care only after development of illness, and subclinical Anemia remains undiagnosed and untreated; and the underlying Anemia might have led to the development of infections which have presented with fever; or the underlying infection also might have led to development of anemia.

This finding is supported by the fact that 38% of the cases in this study have presented with bronchopneumonia and 16% of the cases have presented with gastroenteritis, and this study is in concordance with the study conducted by Pramila Ramawat et al,<sup>[10]</sup> where fever was a common presentation and lower respiratory tract infections are the most common cause of admission.

#### **Nutritional status:**

Iap grading was used to assess malnutrition.

In the present study, nutritional status was observed to be normal in 30% of the cases, 34% of the cases had grade I malnutrition, 22% of the cases had grade II malnutrition, 10% of the cases had grade III malnutrition and 4% of the cases had grade IV malnutrition.

This study is in concordance with the study done by Manoj S et al,<sup>[12]</sup> 13% of the cases were undernourished and 1.6% of the cases were obese; anemia was recorded even in children with normal nutritional status and also in obesity and this factor was attributed to the increasing trend of calorie

dense food with lack of essential vitamins and minerals.

#### **Social economic status:**

Modified Kuppaswamy socio economic status scale 2019 was used;

In the present study, 10% of the cases belonged to upper class; 14% of the cases belong to upper middle class, 22% of the cases belonged to lower middle class, 30% of cases belonged to upper Lower class and 24% of the cases belonged to lower class.

This study is in correlation with the study conducted by Gupta D et al,<sup>[13]</sup> where it was seen that lower socio-economic strata are associated with increased risk of developing anemia.

#### **Haematological parameters:**

In the present study, mild anaemia is seen in 11 cases ie.22% of the cases; moderate anaemia is seen in 26 cases ie.52% and severe anaemia is seen in 13 cases ie.26% of the cases.

This study is also in concordance with the study done by Faraz Ahmad Khan et al,<sup>[11]</sup> where in the study population, no anaemia was seen in 35% of the cases, mild anaemia was seen in 24% of the cases; moderate anaemia was seen in 31% of cases and severe anaemia was seen in 10% of the cases , and with the study done by Sailaja et al.,<sup>145</sup> in which , they have found that 91.5% of children of their study population were suffering from various degrees of anaemia; 14.6% of the cases were having mild anaemia; 61.5% of children were having moderate anaemia; and 15.4% of the cases were having severe anaemia.

#### **Haemoglobin:**

In the present study, 10% of the cases had haemoglobin between 3-5gm/dl; 16% of the cases had haemoglobin between 5-7gm/dl and 74% of the cases had haemoglobin between 7-11 gm/dl.

#### **Packed cell volume:**

The packed cell volume was decreased in degree to the relation of Anaemia

The packed cell volume was decreased in all cases, in comparison to the age specific reference standards, the mean PCV in this study is  $25.43 \pm 6.09$ ; and majority of the cases had PCV in the range of 20 – 30.

#### **RBC indices:**

An auto analyser determines the RBC indices like MCV, MCH, MCHC.

##### **1. Mean Corpuscular Volume:**

MCV less than 80fl was seen in a majority of (84%) of cases; followed by 12% of the cases with MCV between 81 -100, and 4% of the cases with MCV more than 100 fl.

The mean MCV in the present study was  $70.84 \pm 13.17$ ; this is in concordance with study done by Madhusudan et al.,<sup>140</sup> where the mean MCV was 65.35fl.

Mean corpuscular volume values less than 75 fl indicates microcytic picture which is seen in 34 cases that is 68% of the cases.

##### **2. Mean Corpuscular Haemoglobin:**

Mean corpuscular haemoglobin per each red cell is estimated by electronic devices; the mean MCH found in the study is  $21.87 \pm 5.40$ ; a lower normal MCH is seen in cases of microcytosis, but even lower values of MCH are seen when microcytosis occurs along with subnormal levels of hemoglobin like as in iron deficiency anaemia and thalassemia.

### **3. Mean Corpuscular Haemoglobin Concentration:**

In the present study, the mean MCHC recorded was  $31.22 \pm 2.40$ , 22 children (44%) had MCHC below 30 g/dl which indicates hypochromic cells and 28 children (56%) had MCHC more than 30 g/dl which indicates normochromic cells

The mean MCV, MCH and MCHC in iron deficiency anaemia are 68.5 fl, 20.9 pg, 31.1 g/dl; which indicates a microcytic hypochromic picture type of anaemia.

In the present study, microcytic hypochromic anaemia was seen in 26 case (52%), normocytic hypochromic picture was seen in 12 cases (24%), normocytic normochromic picture was seen in 10 cases (20%), and macrocytic anaemia was seen in 2 cases (4%). sickling was positive in all the four cases of sickle cell anaemia. majority of the cases with microcytic hypochromic anaemia were diagnosed as Iron deficiency anaemia, followed by thalassemia, both the cases with macrocytic picture have been diagnosed as megaloblastic anaemia, and majority of the normocytic normochromic anaemia was due to haemolysis by malarial parasites and dengue.

#### **Types of anaemia according to aetiology:**

Based on the aetiology, in the present study nutritional anaemia's are the commonest type accounting for about 66 cases (66%) of which 62 cases are of iron deficiency anaemia and 4 cases are of megaloblastic anaemia, followed by haemolytic anaemia's which were seen in 32 cases (32%), of which there were 8 cases (8%) are of dengue; 6 cases (6%) of malaria; and on 2 case (2%) of sickle thalassaemia; 6 cases (6%) of sickle-cell anaemia, 4 cases (4%) of beta thalassaemia minor and 6 cases (6%) of beta thalassaemia major; followed by two case (2%) of aplastic anaemia.

The incidence of various aetiology of the present study is compared to the study done by Amieeleena Chhabra et al,<sup>[14]</sup> where a study of anaemia was conducted in hospitalized children of a territory care Hospital in north India in the year 2014. This present study is in concordance with the above study done by Amieeleena et al,<sup>[14]</sup> where nutritional anaemia is the most common cause of anaemia in children.

It is also compared with the study done by Pramila Ranwat et al,<sup>[10]</sup> where a retrospective study was conducted on the clinico-haematological profile of anaemia in children, where nutritional anaemia was the most common cause of anaemia.

WHO has shown an estimate that Iron deficiency anaemia constitutes about 50% of the cases of

anaemia in children less than five years of age and micronutrient deficiency is the main culprit in the causation of the nutritional anaemias?

#### **Iron deficiency anaemia:**

In the present study iron deficiency anaemia was diagnosed in 62 cases (62%) among the 62 cases of iron deficiency anaemia; 32 cases were in the age group 6 months - 3 years; 18 cases were in the age group 3 - 6 years; and 12 cases were in the age group 6 - 12 years.

Four cases of iron deficiency anaemia presented with Bronchial Asthma, 24 cases with bronchopneumonia, six cases presented with bronchiolitis, two case with empyema, ten cases with gastroenteritis, two case with Hyper IgE syndrome, four cases with pulmonary tuberculosis, two case with pyogenic meningitis, two case with urinary tract infection and six cases with viral hepatitis.

The incidence of nutritional anaemia specifically Iron deficiency anaemia is more common during infancy and adolescence ie. during the periods of growth.

Since most of the cases included in the present study were below the age group of 5 years, and are from the lower social economic strata; there were improper feeding practices along with feeding of nutrient deficient foods and high incidence of infections; all the above factors have been implicated in the occurrence of iron deficiency anaemia as the most common type of anaemia in the present study.

There was deficiency in the calories and proteins along with the history of delayed weaning and continuation of breastfeeding for 1- 2 years; and also micronutrient deprived foods like curd and rice being most commonly used as complimentary feeds in the present study, which has made children more prone to develop acute and chronic infections like bronchopneumonia, gastroenteritis, urinary tract infections and worm infestations.

Of the 62 cases, 20 cases are of mild anaemia, 32 cases are of moderate degree and ten cases are of severe anaemia.

Peripheral smear examination showed microcytic hypochromic picture in 40 cases Normocytic hypochromic picture in 18 cases, Normocytic Normochromic picture in 4 cases.

RBC indices, revealed microcytic hypochromic anaemia in a majority of cases and reticulocyte count was  $<2$  in a majority of cases; Therefore, the diagnosis of iron deficiency anaemia can be made by simple investigations like PCV, haemoglobin estimation, RBC indices and peripheral smear examination.

The highly sensitive indicators in diagnosis of iron deficiency anaemia are serum ferritin and bone marrow haemosiderin levels; but these are not necessary in all cases with iron deficiency anaemia since RBC indices along with peripheral smear examination is enough to reach a presumptive diagnosis; iron studies are especially useful to

differentiate between anaemia of chronic inflammation and iron deficiency anaemia.

#### **Megaloblastic Anaemia:**

There were two cases of megaloblastic anaemia in the study, one case presented with urinary tract infection and another case presented with bronchopneumonia; both the cases showed macrocytosis in the peripheral smear; serum B12 levels and serum folic acid levels were sent and the diagnosis was made.

#### **Haemolytic anaemia:**

In the present study, thalassaemia was found in five cases, these children presented with irritability, pallor; abdominal distension; growth retardation and icterus.

Abdominal distention was seen in these cases due to enlargement of the liver and spleen

Out of the ten cases, six cases had severe anaemia, four cases had moderate anaemia, x-ray skull showed hair on end appearance in one case, peripheral smear in 8 cases had microcytic hypochromic picture, and two case had normocytic hypochromic anaemia ; frontal bossing was seen in 8 out of 10 cases, and hepatosplenomegaly was seen in all the ten cases. Ejection systolic murmur was seen in six cases, four cases with severe anaemia and one case with moderate anaemia; and growth retardation was seen in 4 cases. In the peripheral smear along with Microcytic hypochromic picture, anisocytosis, teardrop cells, poikilocytosis, polychromatic cells, nucleated RBCs and also fragmented cells were seen. The MCV value is important in diagnosis of thalassaemia; MCV of less than 75fl is generally seen in all the cases of thalassaemia. Hb electrophoresis was done in all the cases which confirmed the diagnosis.

In the present study, sickle cell anaemia was seen in eight cases; six cases were with moderate anaemia, two case presented with severe anaemia, peripheral smear showed microcytic hypochromic picture in four cases and Normocytic Normochromic picture in two case; normocytic hypochromic picture in two case, with positive sickling test in all the cases.

Two case was diagnosed to have sickle thalassaemia trait; six cases had bone pains; two cases had hepatosplenomegaly and six cases had splenomegaly.

In the present study, malaria was seen in six cases, four cases had severe anaemia, and two case had Moderate anaemia. The peripheral smear in all the three cases showed Normocytic Normochromic picture.

All the six cases had splenomegaly and one case in the study presented with cerebral malaria.

All the cases of malaria presented with high grade fever with chills and rigors and with splenomegaly. Plasmodium falciparum is the causative agent in all the three cases; Anaemia is seen in malaria due to haemolysis of the parasitized RBCs and also due to delayed release of the red cells from the marrow. In the present study, Dengue was seen in four cases, one case had severe anaemia and three cases had

moderate anaemia, peripheral smear in all four cases was of Normocytic Normochromic type; all four cases showed and NS1 and IgM positivity; platelets in all the four cases showed decreasing trend; the common signs elicited were presence of petechiae and Dengue Rash; and all the four cases had hepatomegaly. Malaria and dengue constituted 43.7% of hemolytic anemia's; this is due to the endemicity of malaria and dengue in the regions of the study.

In the present study, nutritional anaemia's have been the most common type of anaemia, in which iron deficiency anaemia was the most common type, majority of the children in this study were malnourished, and belonged to lower socioeconomic status, these factors can be considered for iron deficiency anaemia to be the most common type.

Majority of the cases have presented with lower respiratory tract infections, lower socio-economic status along with malnutrition might have predisposed the child to frequent infections, and decreased feeding during the illness and post illness period along with the burden of the disease, might have led to iron deficiency. Iron deficiency might also have led to development of frequent infection, and therefore from preventing the child from falling into this vicious cycle, underlying subclinical iron deficiency should be promptly identified, and treated. Haemolytic anaemias were the second most common type, majority of them were due to Malaria and Dengue, this can be addressed by increasing the awareness regarding the disease pattern, breeding places and precautionary steps to be taken, followed by thalassaemia and sickle cell anaemia, where proper genetic testing needs to be done and premarital as well as prenatal counselling has to be given.

## **CONCLUSION**

In the present study, nutritional anaemia's have been the most common type of anaemia, in which iron deficiency anaemia was the most common type followed by Haemolytic anemia due to infections like Malaria, Dengue etc. Majority of the children in this study were malnourished, and belonged to lower socioeconomic status. The suggested interventions include early diagnosis, effective management, and treatment of anaemia. In low-income countries, iron deficiency should not be addressed alone, but deficiencies of other micronutrients and hematinic factors, infections, and lead poisoning should be resolved, too<sup>15</sup>, and that will require measures to improve social and economic policies that fight poverty. We emphasis on creating awareness on sanitation to prevent infections and nutritional counselling to parents on consumption of iron-rich foods and iron supplementation to prevent anemia among young children with special attention on those from low-

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