Original Article

Clinical Profile Of Iron Deficiency Anemia In Children Of 6 Months To 5 Years Age

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Abstract

Anemia during childhood adversely affects mental, physical, and social development of children. Iron shortage can arise even in the absence of anaemia, and this condition might have an impact on the tissues. Different stages of iron insufficiency might present in different ways. When intake of iron falls short of demand, iron reserves are predominantly depleted. The study aims to describe clinical profile of iron deficiency anemia in children of 6 months to 5 years age along with various factors affecting severity. The clinical profile of iron deficiency anemia was studied, and it was found that 27% of children had mild anemia, 60% had moderate anemia, 13% had severe anemia. In our study we found out factors like gestational age, birth weight, malnutrition, mothers' diet etc were contributing to severity of anemia. Timely initiation of complementary feed is very essential to achieve adequate absorption of iron.

Keywords: Iron deficiency anemia, Clinical features of anemia, Anemia in children.

INTRODUCTION

Iron being the important micro-nutrient which is essential for various functions in human body. It is essential for cellular growth and differentiation, oxygen binding, transport and storage, enzymatic reactions, immune function, cognitive function, mental and physical growth etc. So, deficiency of iron due to either physiological or pathological reason can affect mental and physical growth resulting in decreased learning capacity and work productivity. IDA is characterized by a defect in haemoglobin synthesis, resulting in hypochromic and microcytic red blood cells. (1) Anemia during childhood adversely affects mental, physical, and social development of the children.

AIMS AND OBJECTIVES

AIM

- ✓ To study the clinical profile of iron deficiency anemia in children of 6 months to 5 years age.

OBJECTIVES

- ✓ To know the clinical profile of iron deficiency anemia among various age groups between children of 6 months to 5 years age.
- ✓ To study the sex distribution of iron deficiency anemia between children of 6 months to 5 years age.
- ✓ To study treatment requirements.

MATERIALS AND METHODS

This was a cross sectional study conducted in the Department of Paediatrics,' Dr. D.Y. Patil Hospital and Research Centre, Pimpri, Pune after approval from institutional ethical committee. This study was conducted from August 2020 to September 2022. Study population comprised of children from age 6month-5years. In the children who were enrolled in this study, after taking informed consent a detailed history including diet and development and clinical examination was taken in the proforma.

The diagnosis is based on history, signs like pallor, and investigations. The investigation includes namely hemoglobin, MCV, MCHC, MCH, RDW, peripheral smear, serum iron level, serum ferritin levels. In these children hemogram, peripheral smear and RDW was done, and those children with peripheral smear showing microcytic and hypochromic blood picture will be taken up for further study. Investigations like serum ferritin, TIBC, iron and transferrin saturation were done to diagnose the iron deficiency state by impedance method in the lab. Hemoglobin level <7gm/dl is severe anemia, 7 to 9gm/dl is moderate anemia, 10 to 11gm/dl is mild anemia according to WHO classification.

Iron deficiency anemia was classified based on:

- Low hemoglobin, Low MCV (less than 80fl)

  Increased RDW (more than 14.5%)
  PS showing a microcytic and hypochromic picture or a normocytic and hypochromic both also anisocytosis and poikilocytosis were taken into consideration.
- Wherever possible - Serum Iron <50mcg/dl(35) (35) (36)

  Serum ferritin<30 ng/ml with CRP levels positive (>5 mg/dl) (37)
  Serum ferritin <20ng/ml If CRP is negative.

Anthropometric measurements were done using standard techniques. Weight (g) was recorded using calibrated weighing machine accurate to 5 g, length (cm) was measured with infantometer and stadiometer accurate to 0.5 cm and head circumference (cm) was measured using a non-stretchable measuring tape.

Blood sample was collected after the consent was taken from parents. The procedure was explained appropriately. The site to be punctured was identified and marked, the puncture site was cleaned aseptically with the spirit-betadine-spirit technique. The blood sample was collected in the syringe and transferred to appropriate bulbs. (Figure 9,10). Sample sent for testing to laboratory. Normal WBC count for age 6 months to 5 years is 6,000 to 17,000.(38) Normal platelet count for 6 months to 5 year is 1.5lacs/cumm to 3.50lacs/cu.mm. Normal RBC count for 6 months to 5 years is 3.9 to 5.1 million/cu mm.

Sample size calculation and Statistical Analysis: Assuming the prevalence of anemia from previous studies to be 51.5 per 100 and in acceptable difference of 8/100 with confidence level of 95% the calculated sample size is 150. The software used to calculate sample size was WinPepi. Bar diagrams and pie charts were used for graphical representation of data. Categorical variables between the groups were compared using Chi Square test. A p value of less than 0.05 was considered statistically significant.

Observations and results: 150 children from age group 6 months to 5 years with hemoglobin less than 11 g/dl were included in this study. Demographic information was collected, all children were subjected to a detailed history, had undergone detailed systemic and clinical examination and results are as follows:

In this study out of 150 children, 82 of them (55%) were males and 68 (45 %) were females. They were divided into different age groups between 6 to 12 months, 13 to 36 months, and 37 to 60 months. Majority of them were males and were in the age group of 6 to 12 months. (Figure 1).

Among 150 children, 20 (13%) children had severe anemia out of which 5 (9%) were from age group 6 to 12 months, while there were 7 (16%) babies of 13 to 36 months age and 8(17%) from age group 37 to 60 months. 90 (60%) children had moderate anemia out of which 37 (65%) were from age group 6 months to 12 months, while 27 (60%) were from the age group 13 to 36 months and there were 26 (54%) babies of 37 months to 60 months of age. 40(27) children had mild anemia out of which 15 (26%) were from age group 6 months to 12 months, while 11 (24%) were from the age group 13 to 36 months and there were 14 (29%) children of 12 37 months to 60 months of age.

Inference–Most of the cases of IDA were found in the age group of 6 to 12 months. (Figure 2)

Out of 40 mildly anemic children, mothers of 28(67.57%) children had a vegetarian diet while 12(32.43%) had a non-vegetarian diet. Out of 90 moderately anemic children, mothers of 85 children (94.12%) were vegetarian while 5 mothers (5.88%) were non-vegetarian. Out of 20, severely anemic children mothers of 18 children (94.44%) were vegetarian while 2(5.56%) had a non-vegetarian diet.

Inference- The association of a vegetarian diet has been significant with the occurrence of IDA. The children with a non-vegetarian diet of the mother were not free of IDA also implicating any other underlying factor leading to the finding of anemia and is probably due to prematurity, delayed onset of complementary feeding, etc. (figure 19) (Table. 1)

Out of a total of 40 mild anemic children, 28(70%) mothers could not complete their matriculation (10th std), 4 (10%) mothers finished 10th std and 8(20%) studied above 10th std. Out of a total of 90 moderately anemic children, 58(64%) mothers could not complete their matriculation (10th std), 16(18%) finished 10th std, 16(18%) studied more than 10th std. Out of 20 severely anemic children, 13(65%) could not complete their matriculation (10th std), 6 mothers (30%) finished 10th std and 1 of them studied more than 10th std. (Figure. 3)

Inference - Most of the cases of anemia were seen in children with mothers' education of 10th or below the 10th standard.

Out of 150 children 142 (95%) patients did not have history of PICA. (Figure. 4) and 114 (76%) patients had pallor while 36 (24%) didn't have pallor. (Figure 5)

Out of 40 mildly anemic children, 3(5.4%) babies did not receive complimentary feeds while 5(13.5%) started after 6 months, 13(35.1%) started after 7 months, 18(43.2%) started after 8 months, 1(2.7%) started after 9 months. Out of 90 moderately anemic children, 6(7.0%) did not receive complimentary feeds, 13(13.8%) started after 6 months, 16(17.3%) started after 7 months, 29(32.1%) started after 8 months, 26(28.8%) started after 9 months. Out of 20 severely anemic children, 8(40%) did not receive complimentary feeds, 2(10%) started after 7 months, 8(40%) started after 8 months, 2(10%) started after 9 months. There was congregation of cases of moderate IDA if the complimentary initiated after 6 months and 9 months. These cases belong to chronic pathological diseases like congenital heart disease with significant shunt lesion, anorectal malformation, children with multiple episodes of pneumonias and diarrheas.

Inference- The severity of IDA was significantly co-related with a history suggestive of not initiation of complementary feeding. (Table. 2)

Out of 40 mildly anemic children, 3 (8.11%) were preterm, 37(91.9%) were term. Out of 90 moderately anemic children, 31(34.65%) were preterm, while 59(65.35%) were term. Out of 20 severely anemic children, 15(83.33%) were preterm, while 3(16.67%) were term.

Inference- Premature babies are iron-depleted and hence significantly cases were premature in the current study. (Table. 3)

Out of 150 children 114 (76%) patients had normal development while 36 (24%) had development delay. (Figure 7)

Out of 40 mildly anemic children 9(21.32%) were low birth weight, while 31(78.68%) were normal birth weight babies. Out of 90 moderately anemic children, 57(63.06% were low birth weight, while 33(36.94%) were normal birth weight. Out of 20 severely anemic children, 2(10.11%) were normal birth weight, 12(59.56%) were low birth weight while 6(30.33%) were all very low birth cases.

Inference-Severe anemia was a significant finding in very low birth weight and low birth weight children. (Table. 4)

The level of serum iron in babies who did not start complementary feeds and was on breastfeeds serum iron was <10 mcg/dl in 13 (43%) cases, 11 to 20 mcg/dl in 4 (16%) cases.
Level of serum iron in babies who started complementary feeds after 6 months of life, 21 to 30 mcg/dl was in 7(24%), 31 to 40 mcg/dl in 7(20%) cases, 41 to 50 mcg/dl was in 4(12%) cases. Level of serum iron in babies who was started on complementary feeds at 7 months of life, serum iron was <10 mcg/dl in 2(7%) cases, 11 to 20 mcg/dl in 3(12%) cases, 21 to 30 mcg/dl in 3 (10%) cases, 31 to 40 mcg/dl in cases in 10 (29%), 41 to 50 mcg/dl in 13(42%) cases. Level of serum iron in babies who started complementary feeds at 8 months of life, serum iron was <10 mcg/dl in 2 (7%) cases, 11 to 20 mcg/dl in 8 (32%) cases, 21 to 30 mcg/dl in 13(45%) cases, 31 to 40 mcg/dl in 18 (51%) cases, 41 to 50 mcg/dl in 14 (45%) cases. Level of serum iron in babies who started complementary feeds at 9 months of life, serum iron was <10 mcg/dl in 13 (43%) cases, 11 to 20 mcg/dl in 10 (40%) cases, 21 to 30 mcg/dl in 6 (21%) cases.

Inference- When breastfeeding is not initiated serum iron was significantly on the lower side as well as serum iron was more if complimentary was initiated in time. (Table.5)

In 40 cases of mild anemia in the study, SAM was observed in 11(27.14%) and MAM was found in 5(12.0%). Out of 90 moderately anemic children, 33(37.65%) had no malnutrition, while 21(23.65%) had moderate acute malnutrition, and 36(38.7%) had severe acute malnutrition. Out of 20 severely anemic children, 3(15.67%) had no malnutrition, while 6(29.22%) had moderate acute malnutrition, and 11(55.11%) had severe acute malnutrition.

Inference - Severe anemia was significantly associated with severe acute malnutrition. (Table.6)

150 children were admitted diagnosed to have IDA out of which 29% had CHD, 25% had LRTI, 10% had febrile convulsion, 8% had iron deficiency anemia, 9% had diarrhoea, 5% had anorectal malformation. (Figure 8)

In this study, mean red blood cell mass in 150 children was 3.60± 0.51 million/cu.mm,The platelet count in mildly anemic children was 3,22,756.76 ± 65072.78 lacs/cu.mm, the platelet count in moderately anemic children was 3,75,847.06 ± 70278.44 lacs/cu.mm., platelet count in severely anemic children was 421277.78 ± 44685.57 lacs/cu.mm.. Red cell distribution width in mildly anemic children is 17.91 ± 1.08%, RDW in moderately anemic children was 18.74 ± 1.43%, RDW in severely anemic children was 22.27 ± 1.31%. Mentzer's index in mildly anemic children is 17.54 ± 1.14, Mentzer's index in moderately anemic children is 18.72 ± 2.29, Mentzer's index in severely anemic children is 23.66±5.33. HCT in mildly anemic children 27.78 ± 1.81%, HCT in moderately anemic children is 25.11 ± 2.11%, in severely anemic children HCT was 16.44 ± 2.54%. Serum ferritin in mildly anemic cases is 17.29 ± 7.54 ng/ml, serum ferritin in moderately anemic children is 18.058 ± 8.09 ng/ml, serum ferritin in severely anemic children was 12.94 ± 7.36 ng/ml. Serum iron in mildly anemic cases is 39.32 ±8.74 mcg/dl, serum iron in moderately anemic children is 24.49 ± 11.60 mcg/dl, serum iron in severely anemic children was 9.50 ± 3.83 mcg/dl. Mean corpuscular volume in mildly anemic children was 69.64 ± 1.43 fL, MCV in moderately anemic children was 67.89 ± 2.88 fL, MCV in severely anemic children was 61.27 ± 5.97 fL.

Inference- IDA in the children manifested with reduced red cell mass, increased platelet count, decreased hematocrit, decreased mean corpuscular volume, positive Mentzer's index and increased red cell distribution width.(table 7).

Serum iron levels when platelets were normal was 33.87 ± 11.04 mcg/dl, serum iron levels when platelet count was high in 21.55±13.04 mcg/dl. Serum ferritin levels when platelets were normal was 17.62+/-7.35 ng/ml, serum ferritin levels when platelet count was high in 16.91±8.40 ng/ml
MCV levels when platelets were normal was 69.14±1.75%, MCV levels when platelet count was high in 66.41 ± 4.71% cases. Low MCV was indicative of IDA and its association with thrombocytosis, but serum iron and serum ferritin values were low in cases with more platelet count than normal platelet count.

Inference - Thrombocytosis was associated with microcytosis of red blood cells.(table 8)

Out of 150 children only 40(27%) patients required blood transfusion while 110 (73%) children did not receive blood transfusion and were started on oral iron therapy and diet modification. Inference: Majority of the patient did not require blood transfusion. (figure 9)

In our study, out of a total of 150 children, 142 (34.29%) got discharged while 8(5.71%) of them died. Out of 40 mildly anemic babies, 38(96.59%) got discharged, 2 (5.4 %) died. Out of 90 moderately anemic children, 5 (5.88%) died and 85 (94.12%) were discharged. Out of 18 severely anemic babies, 1(5.56%) died while 19(94.44%) were discharged. (Figure 10, 11)
Inference- The degree of anemia was not co-related significantly with deaths in cases of IDA.

DISCUSSION

The most prevalent dietary deficit worldwide, iron insufficiency is a significant public health issue, particularly in underdeveloped nations.

- Out of 150 children, them 82 (54.7%) were males and 68 (45.3 %) were females. These results were in accordance with **Sunil Gomber et al [2], Abhishek Janjale et al[3], Jasima et al**[4] who reported Male: Female as 1.15:1, 1.45:1 & 1.7:1 respectively. They were separated into groups based on their ages, which ranged from 6 to 12 months, 13 to 36 months, and 37 to 60 months. Majority of them were males and were in the age group 6 to 12 months. Similar observations were reported by **Sharda Sidhu et al. [5]**
- Getting sufficient amounts of iron from non-heme iron sources can be a challenge. This is especially true considering that the iron requirements for vegetarians are about 1.8 times higher, compared to non-vegetarians.[6] In our study, the association of a vegetarian diet has been significant with the occurrence of IDA. The children with a non-vegetarian diet of the mother were not free of IDA also implicating any other underlying factor leading to the finding of anemia and is probably due to prematurity, delayed onset of complementary feeding, etc.
- If there is no major blood loss during the first six months of life, iron reserves are enough to provide erythropoiesis. Physiological anaemia develops in the postnatal period. [7] The stores run out sooner in babies with low birth weight and those who experience perinatal blood loss because of their smaller size. Delaying the clamping of the umbilical cord may increase iron levels and lower the risk of iron insufficiency. However, in our study, the mean birth weight(kgs) across female and male groups were 2.36(±0.33) and 2.31(±0.36) respectively.
- In the present study, the mean Hb(gm/dL) across female and male groups were 8.53(±1.58) and 8.17(±1.62) respectively. All anemic children of IDA exhibited microcytic hypochromic picture on peripheral smear analysis. Similar results were found in studies by **Neuman NA et al[8] and Silva DG et al[9]**.
- Inability to differentiate between iron deficiency anemia and beta thalassemia trait on the basis of blood picture and non-affordability of tests like Hb electrophoresis and iron studies has led to the invention of indices using blood counts.[10] The most commonly used Mentzer Index, devised by Mentzer in 1973. In iron deficiency anemia, a smaller number of red blood cells are produced by bone marrow, resulting in low RBC counts and low mean corpuscular volume (MCV). So, the Mentzer Index is >13. In thalassemia, the number of RBCs produced is normal but due to defective beta globin chain, the red blood cells are smaller

in size and more fragile, resulting in normal red blood cell count and low mean corpuscular volume. So, the Mentzer Index is <13.[10] In the present study, the mean(sd) Mentzer's index across Female and Male groups were 18.54(±2.59) and 19.66(±3.94) respectively and the difference between the means was statistically significant with a p value of 0.047.

- There was congregation of cases of moderate IDA if the complimentary initiated after 6 months and 9 months. These cases belong to chronic pathological diseases like congenital heart disease with significant shunt lesion, anorectal malformation, children with multiple episodes of pneumonias and diarrheas. Similarly, another study by **Magadum et al [11]** reported that initiation of top milk before 12 months was associated with higher chances of IDA especially before 6 months.

- The study population was on exclusive breastfeeding or some type of predominant food item. The content of iron in some food items is variable while some of them have restricted bioavailability of iron after the ingestion hence the severity of iron deficiency was noted with cow milk and predominant breastfeeding up to the age of 12 months. The cow milk ingestion before the age of 12 months significantly affected the hemoglobin status of the study population increasing the cases of severe anemia. Likewise, not initiating the complementary feeding impacted the hemoglobin status too.
- Severe anemia was a significant finding in very low birth weight and low birth weight children. **Domellof et al** reported that infants with low birth weight (<2,500 g) are at high risk of iron deficiency and poor health outcomes. **[12]**
- Jimenez K, Kulnigg-Dabsch S, Gasche C et al reported that in patients with chronic iron deficiency anaemia, blood transfusions should be severely limited. Consideration may be given to it if the anaemia cannot be treated by any other means, if the patient has current bleeding and is hemodynamically unstable, or if the patient has serious anaemia (Hb level 7 g/dL). Higher cut-off values (Hb 8 g/dL) may be necessary in people with substantial cardiovascular disease. Transfusions are simply a short-term fix, and appropriate therapy calls for identifying and treating the underlying cause. To correct and maintain the Hb level and iron storage and avoid the need for additional transfusions, intravenous iron (and erythropoiesis-stimulating drugs, if necessary) should be provided concurrently. [13]

CONCLUSION

- Both globally and in India, iron deficiency anaemia continues to be a serious public health issue. Our study's conclusions suggest that Mentzer's Index can be utilised as a discriminatory test to distinguish between beta thalassemia phenotype and iron deficiency anaemia. Definitive diagnostic tests can then be administered to the high-risk group. Better patient compliance and cost effectiveness may arise from this.
- The clinical profile of iron deficiency anemia was studied and it was found that 27% of children had mild anemia, 60% had moderate anemia, 13% had severe anemia.
- Iron deficiency anemia was found to have an association with prematurity, low birth weight, illiteracy, malnourishment, late or no initiation of complementary feeding and consumption of cow milk at an early age.
- Congenital heart disease, lower respiratory tract infection, and diarrhea are some of the important morbid conditions associated with IDA.
- It was found that diet deficient in iron is responsible for IDA in infants.
- Timely initiation of complementary feed is very essential. Early or late initiation can interfere with the absorption of iron and can lead to iron-deficient state. In the study prematurity and use of cow milk were found to be the cause of IDA.
- For the best results in IDA, low-cost, logical, randomized-controlled studies examining the key variables such as dose, side effects, compliance, and treatment length are required.

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TABLES

TABLE.1 - Anemia in children and diet in mother

Diet of mother / Severity	Mild	Moderate	Severe	Total	P-value
Vegetarian diet	28(67.57%)	85(94.12%)	18(94.44%)	131 (87.14%)	0.001
Non-vegetarian diet	12(32.43%)	5(5.88%)	2(5.56%)	19 (12.86%)	
Total	40(100%)	90(100%)	20(100%)	150(100%)	

TABLE 2. Age of initiation of complementary feeds and its comparison with severity of anemia.

Age	Mild	Mod	Severe	Total	P value
>6 months	5(13.5%)	13(13.8%)	0	18(12.7%)	0.001
>7 months	13(35.1%)	16(17.3%)	2(10%)	31(20.3%)	
>8 months	18(43.2%)	29(32.1%)	8(40%)	55(37.1%)	
> 9 months	1(2.7%)	26(28.8%)	2(10%)	29(18.4%)	
Did not initiate	3(5.4%)	6(7.0 %)	8(40%)	17(11.5%)	
Total	40(100%)	90(100%)	20(100%)	150(100%)	

TABLE 3. Co-relation of IDA with gestation age of the children

	MILD	MOD	SEVERE	Total	P value
TERM	37(91.9%)	59(65.35%)	3(16.67%)	99(64.29%)	0.001
PRETERM	3(8.1%)	31(34.65%)	17(83.33%)	51(35.71%)	
Total	40(100%)	90(100%)	20(100%)	150(100%)	

TABLE 4. Co-relation of birth weight with severity of anemia

	MILD ANEMIA	MODERATE ANEMIA	SEVERE ANEMIA	Total	P value
Normal BW	31(78.68%)	33(36.94%)	2(10.11%)	66(44.43%)	0.001
LBW	9(21.32%)	57(63.06%)	12(59.56%)	78(50.29%)	
VLBW	0	0	6(30.33%)	6(4.28%)	
	40(100%)	90(100%)	20(100%)	150(100%)	

TABLE 5. Co- relation of age of initiation of complementary feeds with Serum Iron(mcg/dl**)**

Age	(<10)	(11-20)	(21-30)	(31-40)	(41-50)	Total	P value
>6 months	0	0	7(24%)	7 (20%)	4 (12%)	18 (12%)	0.001
>7 months	2(7%)	3 (12%)	3 (10%)	10 (29%)	13 (42%)	31 (21%)	
>8 months	2 (7%)	8 (32%)	13(45%)	18 (51%)	14 (45%)	55 (37%)	
>9 months	13 (43%)	10 (40%)	6 (21%)	0	0	29 (19%)	
Not Started	13 (43%)	4 (16%)	0	0	0	17 (11%)	
Total	30 (100%)	25 (100%)	29 (100%)	35(100%)	31 (100%)	150 (100%)	

TABLE 6. Co – relation of malnourishment and severity of anemia

	Mild	Moderate	Severe	Total	P-value
No malnutrition	24(60.86%)	33(37.65%)	3(15.67%)	60(40.14%)	0.01
MAM	5(12.0%)	21(23.65%)	6(29.22%)	32(21.43%)	
SAM	11(27.14%)	36(38.7%)	11(55.11%)	58(39.43%)	
Total	40	90	20	150	

TABLE 7. Investigations in anemic children and comparison of their severity

Investigations / severity	Mild N=40 (MEAN±SD)	Moderate N=90 (MEAN±SD)	Severe N=20 (MEAN±SD)	TOTAL N=150 (MEAN±SD)	P value
RBC (millions/cu.mm.)	(3.97 ± 0.20)	(3.64± 0.34)	(2.63± 0.41)	(3.60± 0.51)	0.001
WBC (cu. mm.)	(10845.94 ±4193.15)	(11554.11 ±4725.42)	(9855.55 ±2959.97)	(11148.57 ± 4411.45)	0.294
PLATLETS (lacs/cu.mm.)	(322756.76 ±65072.78)	(375847.06 ±70278.44)	(421277.78 ± 44685.57)	(367657.14 ± 72633.67)	0.001
RDW (%)	(17.91 ± 1.08)	(18.74± 1.43)	(22.27±1.31)	(18.97±1.87)	0.001
MENTZER'S INDEX	(17.54± 1.14)	(18.72 ±2.29)	(23.66± 5.33)	(19.05± 3.22)	0.001
HCT (%)	(27.78±1.81)	(25.11± 2.11)	(16.44± 2.54)	(24.70±3.91)	0.001
SERUM FERRITIN(ng/ml)	(17.29±7.54)	(18.05±8.09)	(12.94±7.36)	(17.2±7.98)	0.0462
SERUM IRON (mcg/dl)	(39.32 ±8.74)	(24.49± 11.60)	(9.50±3.83)	(26.48 ±13.66)	0.001
MCV (fL)	(69.64 ±1.43)	(67.89± 2.88)	(61.27± 5.97)	(67.50±4.03)	0.001

TABLE 8. Relation of platelets with respect to serum iron, serum ferritin, MCV

	PLATLETS (NORMAL) (N=64)	THROMBOCYTOSIS (N=86)	P VALUE
SERUM IRON (mcg/dl)	(33.87 ±11.04)	(21.55+/-13.04)	0.001
SERUM FERRITIN (ng/ml)	(17.62+/-7.35)	(16.91+/-8.40)	0.6089
MCV (%)	(69.14+/-1.75)	(66.41+/-4.71)	0.0001

FIGURES

Figure 1. Distribution of age and sex in the study population

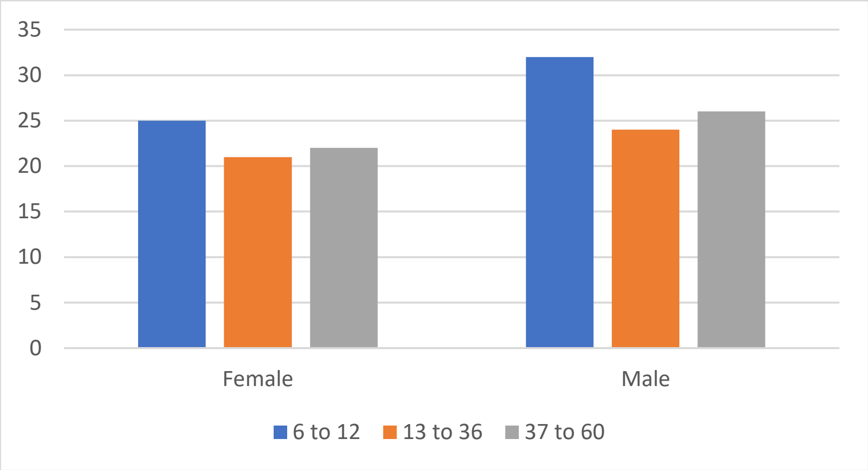

Figure 2. Association of Age and severity of anemia

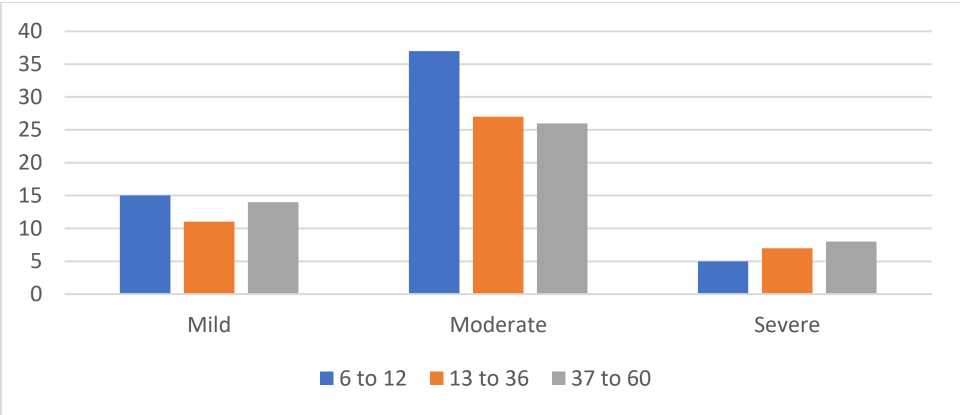

Figure 3. Co-relation of education of mother and severity of anemia

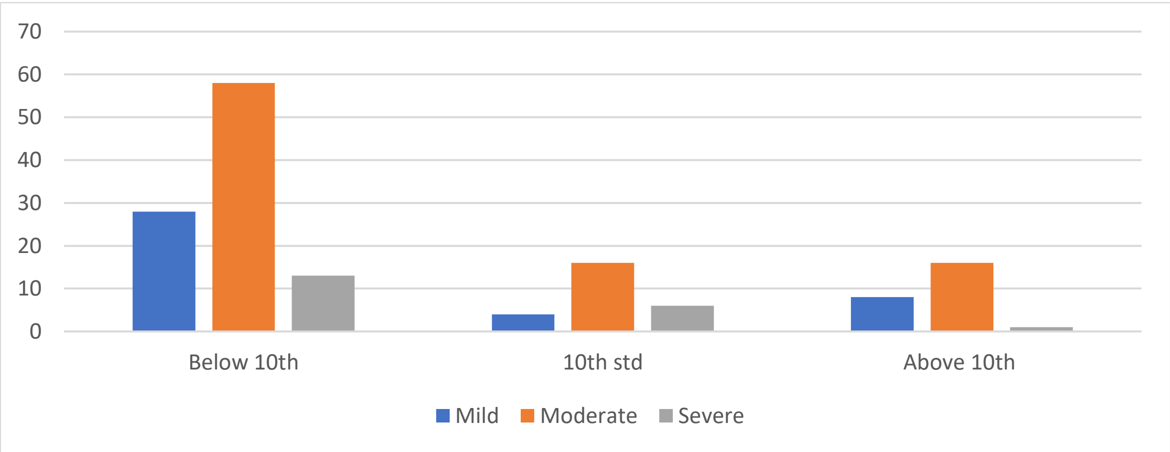

Figure 4. Distribution of history of Pica among study participants

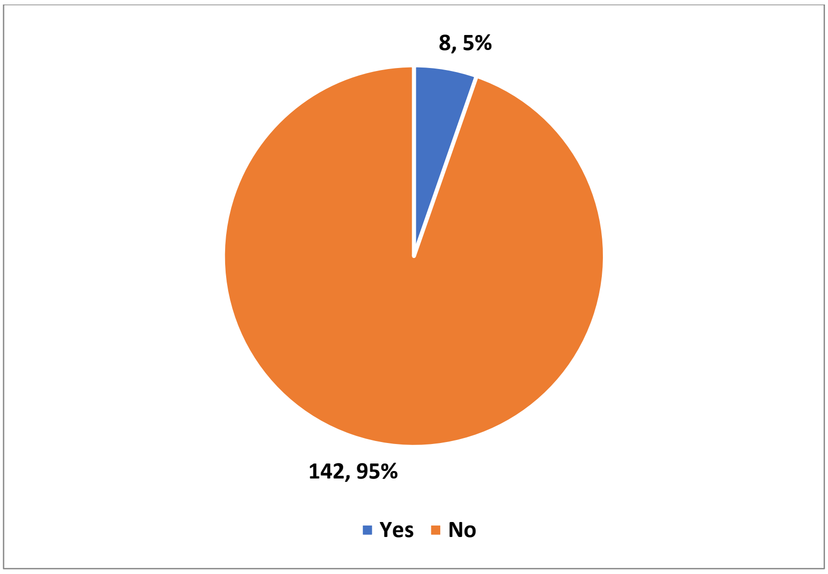

Figure 5. Distribution of Pallor among study participants

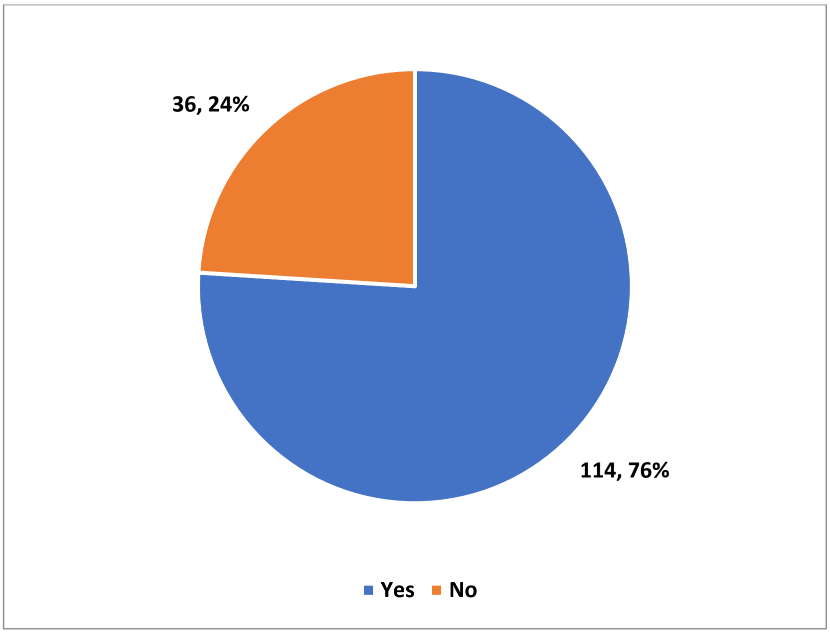

Figure 6. Distribution of Developmental Delay among the children.

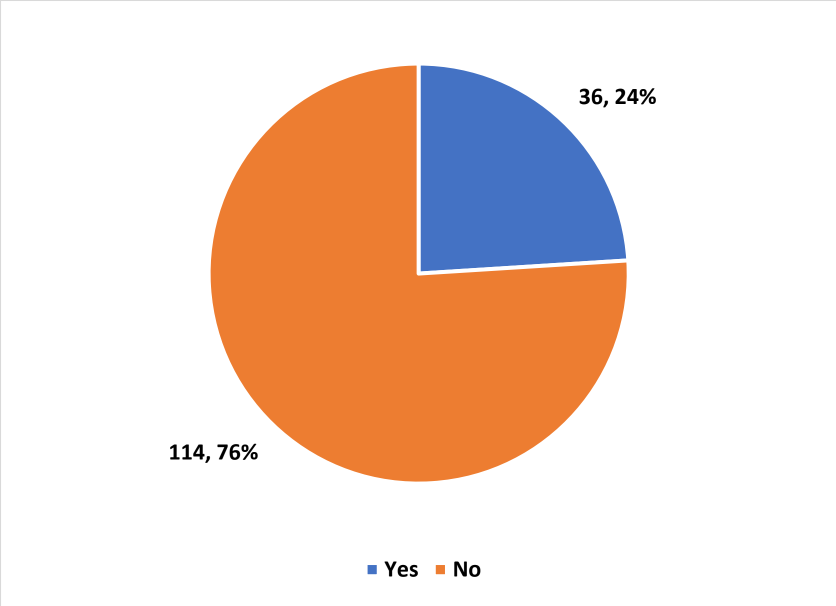

Figure 7. Diagnosis at the time of admission in comparison to the severity of anemia

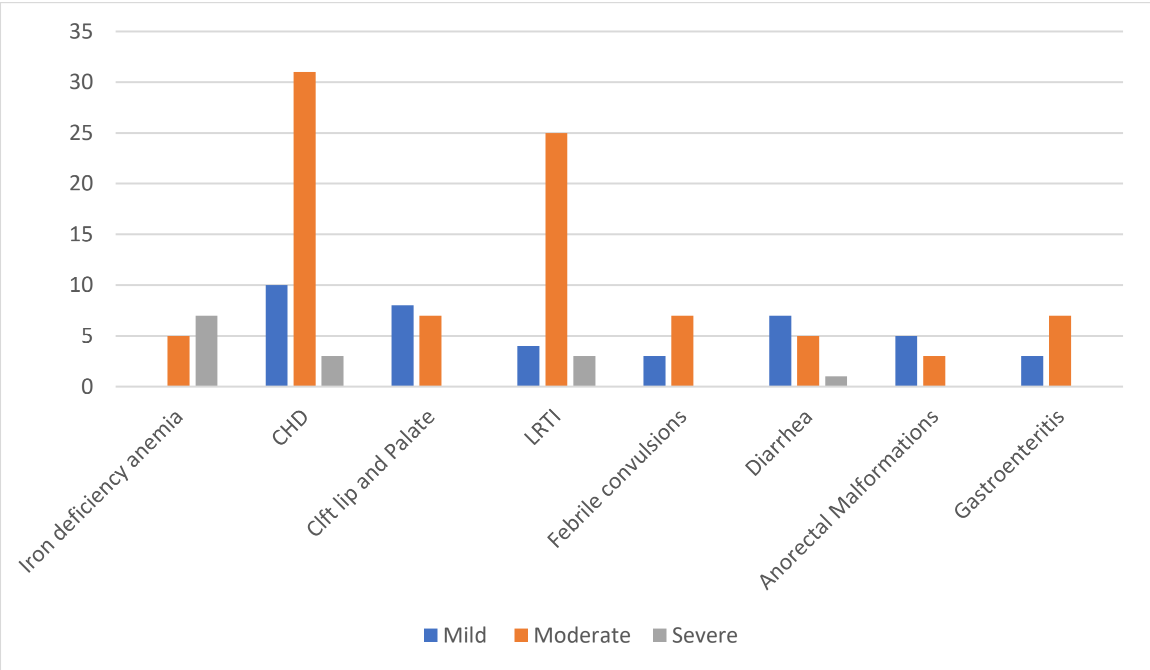

Figure 8. Number of children requiring blood transfusion.

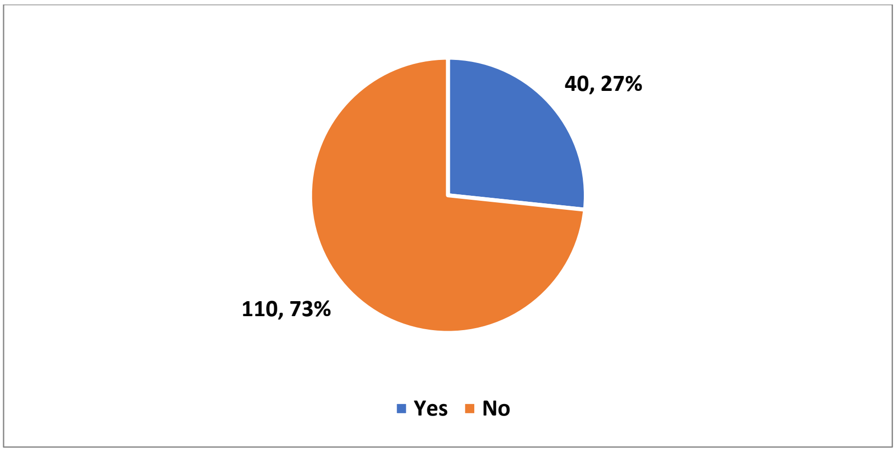

Figure 9. Death and survival with grade of anemia

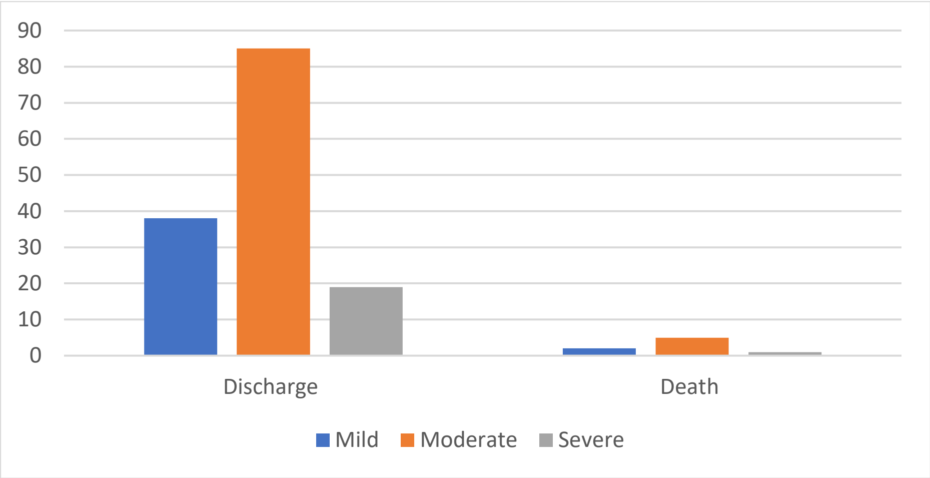

Figure.10 Distribution of mortality.