A Study on Etiology And Severity of Anaemia In 1month to 12 Year Old Children At A Tertiary Health Care Centre of Upper Assam

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Abstract: *Anaemia is a global health problem .Despite numerous health initiatives for its control, anaemia is still a severe health problem in India. In order to target anaemia control measures effectively in any part of this country,   it is important to know the distribution and types of anaemia prevalent in that particular region. This is the backdrop of the present study undertaken in Dibrugarh district of Upper Assam. Objective: To study the etiology and severity of anaemia in 1month to 12 year old children.*
Methods: *Cross-sectional observational study done in outpatient and inpatient department of Assam Medical College and Hospital. 300 patients with pallor and low haemoglobin levels were studied.*
Results: *35.8% of anaemic children were under 5 years and 64.3% between 5-12 years. Nutritional anaemia comprised 62.3% cases while ,Haemolytic anaemia 30.6%,Aplastic anaemia 3.33%, malignancies 2.3% and anemia from blood loss1.3% cases. Iron deficiency anaemia followed by sickle cell disease, beta thalassemia and HbE beta thalassemia were the predominant causes seen in the anaemic cases.25 cases had a combination of 2 different types of anaemia. 66% cases had severe anaemia and 34% moderate anaemia. Nutritional anemia group had the largest number of cases from severe anaemia.*
Conclusion:*Iron deficiency anaemia is the major type of anaemia prevalent—but beside health measures to check nutritional anaemia, genetic counselling and proper education about haemolytic anaemias should form an important domain in anemia control programmes. Possibility of coexistence of two different types of anaemia should be considered to avoid delayed diagnosis and treatment failure.*
Keywords: *Anaemia,Etiology,Severity,UpperAssam,*

I. Introduction

Anaemia is a global health problem affecting both developing and developed countries alike --- the burden being higher in the developing countries. The WHO global database on anaemia shows the highest prevalence of anaemia amongst the preschool age children(47.4%) followed by the pregnant women(41%).[1]And the highest prevalence of anaemia is seen in the African continent followed by the south-east asian region. With a prevalence rate of 40%, anaemia is a severe health problem in India. The National Family Health SURVEY –III showed the prevalence of anaemia in children under 5 years to be around 70% while about 79% of those belonging to the below three age group suffer from varying degrees of anaemia.[2]

Different studies have shown that children anaemic in infancy continue to have poor cognition, school achievement, and more behavior problems into middle childhood.[3,4,5] This implies the significance of detection and cure of anaemia early.

The paediatric population of Assam state of north-east India represent a mixed community comprising of the Ahoms, the tea garden community and some other ethnic groups amongst whom an increased prevalence of HbE, Sickle cell disease and Thalassemia is seen. This apart, Assam like other parts of India has its own fraction of children suffering from malnutrition and hence anaemia caused by micronutrient deficiency. Sometimes both coexist leading to severe anaemia. Several studies have investigated one or the other form of anaemia in this population, but few provide an overall insight into the profile of anaemia

Therefore the present study was undertaken with the following objectives:

* To evaluate the different etiologies of anaemia in the age group 1 month-12years.
* To study the severity of anaemia amongst the above population.

II. Materials And Methods

The present study was a prospective cross-sectional observational study undertaken at the Inpatient and Outpatient Department of the Department of Paediatrics of Assam Medical College and Hospital, Dibrugarh, from the period of July 2012 to June 2013.

Inclusion criteria: All new cases in the (1month-12 year) age group with pallor on clinical examination and haemoglobin levels lower than the normal range as per the WHO cut off values[1] were included. Also included were already diagnosed cases of haemoglobinopathies.

Exclusion criteria: Children less than 1month and more than 12 years of age and extremely moribund patients (patients in shock or those who failed to revive after resuscitation) were excluded from study.

The study was cleared by the institutional ethics committee. After taking informed consent from each of the cases, a detailed history and physical examination and baseline investigations of complete blood count(CBC), reticulocyte count and peripheral blood smear(PBS) were done. Then depending on whether the anaemia was microcytic or megaloblastic anaemia or normocytic anaemia and correlating with other findings on the PBS, the further investigations were done to evaluate the cause of anaemia. Some of the investigation methods used included CBC by Siesmex Automated cell counter, PBS study by Leishman staining, reticulocyte count by Brilliant cresyl blue staining, serum ferritin levels by Immunoradiometric assay, serum TIBC using VITROS TIBC slide method, serum iron by VITROS Fe slide method, serum B12 and folic acid levels estimation by electrochemiluminescence method, HPLC and bone marrow study. After collection of data ,the same was analysed using SPSS16.0 software.

III.   Results And Observations

A total of 300 cases were anaysed. The table1 shows the demographic profile of cases.

Table1: Demographic profile of cases

Age group	1mth-1yr	>1yr-3yr	>3yr-5yr	>5yr-7yr	>7yr-9yr	>9yr-12yr	Total
Male	12	23	20	33	33	39	160
Female	14	26	12	30	26	32	140
Total	26	49	32	63	59	71	300
Percentage	8.67%	16.33%	10.67%	21%	19.67%	23.66%	100%

More than one-third of the cases constituting 35.8% belonged to the under 5 year age group. 64.3% (193 children) were in the age group of 5-12 years.

Of the 300 children, 140 cases (47%) were females and 160 cases(53%) were males.

Table 2 shows the etiological distribution of cases—nutritional anemia was the most predominant cause followed by haemolytic anaemia.

Table 2: Etiological distribution of cases

Etiology	Males (percentage of total male cases)	Females(percentage of total female cases)	Total cases	Percentage of total
Nutritional anaemia	95 (59.4%)	92(65.7%)	187	62.3%
Haemolytic anaemia	52(32.5%)	40 (28.6%)	92	30.6%
Aplastic anaemia	5 (3.1%)	5 (3.6%)	10	3.33%
Anaemia due to malignancies	4 (2.5%)	3 (2.1%)	7	2.3%
Haemophilia	2(1.25%)	0	2	0.67%
Anaemia due to blood loss	2 (1.25%)	0	2	0.67%

A total of 25 cases had a combination of more than one type of anemia. These cases have been shown in the table 3.

Table 3: Cases with more than one type of anaemia

Etiology	Male	Female	Total
Iron deficiency anaemia and megaloblastic anaemia	1 3	7	21
Hb E trait with Iron deficiency anemia	0	2	2
HbE disease with Megaloblastic anaemia	0	1	1
Sickle cell trait with iron deficiency anemia	0	1	1

A total of 187 cases were from nutritional anaemia. Pure iron deficiency anaemia was the predominant form of nutritional anaemia seen. Figure 1 shows the distribution of cases suffering from nutritional anaemia.
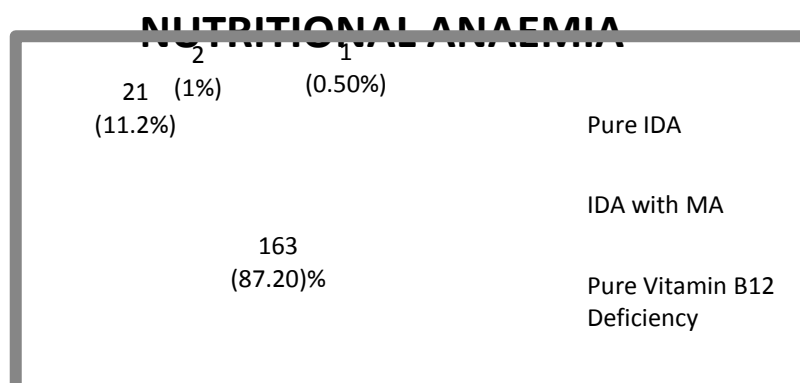
NUTRITIONAL ANAEMIA

21 (11.2%) 2 (1%) 1 (0.50%)

163 (87.20)%

Pure IDA

IDA with MA

Pure Vitamin B12 Deficiency

Figure 1: Case distribution in Nutritional anaemia

Figure 2 shows the distribution of cases of haemolytic anaemia. The largest number of cases were from sickle cell disease followed by beta thalassemia major.
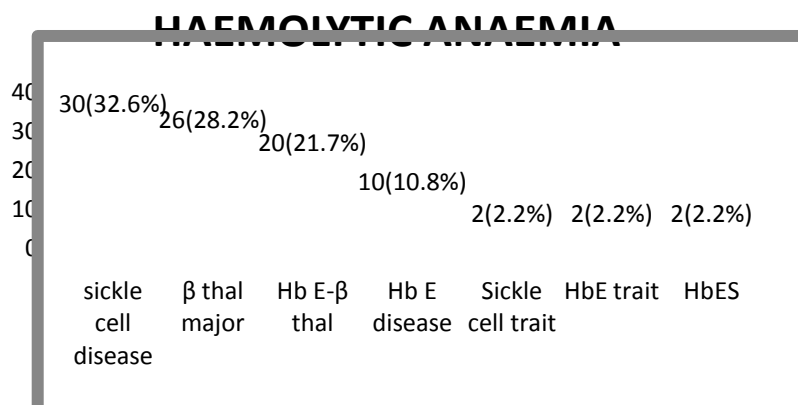
HAEMOLYTIC ANAEMIA

40
30   30(32.6%) 26(28.2%)
20   20(21.7%)
10   10(10.8%)
0   2(2.2%) 2(2.2%) 2(2.2%)

sickle cell disease | β thal major | Hb E-β thal | Hb E disease | Sickle cell trait | HbE trait | HbES

Figure2: Case distribution in Haemolytic Anaemia.

Amongst the other causes of anaemia, aplastic anaemia constituted 10 cases, acute lymphoblastic leukemia 3 cases, acute myeloblastic leukemia 2 cases, chronic myeloid leukemia 2 cases, Haemophilia 2 cases and anaemia from gastrointestinal blood loss 2 cases.

IV. Severity Of Anaemia

The table beneath shows the distribution of cases depending on the haemoglobin levels.

Table 4: Distribution of cases based on severity of anaemia

Type of Anaemia	Severe Anaemia		Moderate Anaemia	
	No.	Percent	No.	Percent
Nutritional Anaemia	126	67.4%	61	32.6%
Haemolytic Anaemia	58	63.1%	34	36.9%
Others	14	66.7%	7	33.3%
Overall	198	66%(of total 300 cases)	102	34% (of total 300 cases)

66% of the cases presented with severe anaemia while 34% had moderate anemia. The largest number of cases with severe anaemia were seen in the nutritional anaemia group while the largest number of cases with moderate anaemia were seen in the haemolytic anaemia group.

V. Discussion

The present study shows a high prevalence of anaemia in the under 5 year age group (35.8%) . The largest no of cases were in the infant and 1-3 year age group. Similar findings were seen by N Arlappa et al [6]and Balakrishnan et al [7] in their studies. This highlights the fact that anemia is very common in the infant age group around the time of weaning from lack of proper nutritious diet and this anaemia is propagated further into the toddler age.

About 64.3% of children were in the school going age group(5-12 years)—a study by Neeraj jain et al[8] showed an anaemia prevalence of 56.5% amongst 5-16 year old children. The high prevalence in this age group can be justified by the increased nutritional needs for growth in this age group as well as the high prevalence of haemolytic anaemia.

Case distribution in both males and females were comparable(53% vs 47%) showing both the groups were equally burdened with anaemia.

Of the total 300 anaemic cases, nutritional anaemia formed the largest percentage of cases (62.3%) followed by haemolytic anaemia (30.6%) and the rest was constituted by apalstic anaemia, leukaemias and anaemias due to blood loss. In a retrospective study done by Mesharam et al, studying the anaemia profile in 54 anaemic children aged 2mths to 12 years, 44.5% cases had nutritional anaemia, 42.6% had haemolytic anaemia while the rest of the cases constituted leukaemia and other etiologies.[9]Another similar study by Madoori et al at Adilabad in 2month-14 year olds showed iron deficiency (58%) , sickle cell disorders 27%, 9 % thalassemia , 5% cases had megaloblastic anemia and 2 % aplastic anemia.[10]Iron deficiency anemia was the predominant form of nutritional anaemia , but few cases also belonged to megaloblastic anaemia from Vitmin B12 and Folic acid deficiency—this highlights the fact that proper identification of the type of nutritional anaemia is necessary to avoid failure of treatment.

The percentage of female cases with nutritional anaemia (65.7%) was higher compared to males(59.4%)— the probable reason was most of the cases belonged to the lower socioeconomic strata—hence financial constraints and lack of awareness led to the girl child`s nutritional and health needs being neglected.

The percentage of cases with haemolytic anaaemia was higher in the males. The largest percentage of cases were due to sickle cell disease followed by beta thalassemia major and HbE beta thalassemia.

A total of 25 cases had a combination of 2 different types of anaemia--- this is an important fact to consider in the treatment of refractory cases of anaemia since treatment of just one entity may not cure the anaemia. Other studies too have shown co-existence of more than one type of anemia.[11,12,13]This is true more so in this part of the country where both nutritional and haemolytic anaemia have high prevalence.

Majority of the cases had severe anaemia with the overall percentage of cases with severe anaemia being 66% (198 cases) while 34% cases had moderate anaemia. In a study done by Mesharam et al, it was seen that about 50% of patients were categorized in severe anaemia, 48.1 % were moderately anaemic and only one case was of mild anaemia.[9] The probable cause for this could be that our study centre being a tertiary centre, only cases with severe disease were referred here while the majority of the cases with moderate and mild anaemia were either treated in the peripheral health services or probably remained undetected. Also the fact that most of the cases belonged to the lower socioeconomic strata with poor literacy rates may have been a cause for the delay in seeking medical attention until the level of overt pallor was reached in these cases.

The percentage of cases with severe anaemia was higher in nutritional anaemia (67.4%) compared to that in haemolytic anaemia (63%) and anaemia from other causes (66.7%).

VI. Conclusion

The current study provides an overall insight in to the profile of anaemia in this part of Assam -- few studies done before in this part of the country provide this kind of information.

Nutritional anemia , more specifically iron deficiency anemia, is seen as the most prevalent form of anemia,with the infant , the toddler and the girl child being being the worst effected. This highlights the need for proper interventions and health measures at the community and the national level in order to check the propagation of anaemia through childhood ,adolescence, pregnancy and back again into childhood again. The high prevalence of haemolytic anaemia mandates proper genetic counseling and information about these diseases for the community.

The coexistence of different types of anemia at presentation as has been seen in several cases mandates careful consideration and evaluation for early diagnosis and proper treatment.

Lastly, this study was a hospital based study due to which the overall clinical and haematological profile of the anaemia cases might have been different from that prevalent in the community. Hence, further study of this type with a community based approach needs to be undertaken in the future.

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