

PREVALENCE OF ANAEMIA AMONG CHILDREN AGED 12 YEARS AND YOUNGER IN NORTH EAST INDIA

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ABSTRACT

BACKGROUND AND OBJECTIVE

Anaemia is one of the most important public health problem among children. The infants, preschool children, adolescents and pregnant women are at highest risk of nutritional anaemia. The aim of this study was to evaluate the prevalence of anaemia and its correlation to age, gender, haemoglobin values and magnitude of anaemia among the children of North East India.

METHODS

A cross sectional study was conducted in a tertiary care hospital between October 2013 to September 2014. A total of 500 children in the age group 0 to 12 years were enrolled after obtaining written informed consent from the parents. Haemoglobin estimation was done by Sahli's method using finger prick blood samples. As per WHO recommendation, haemoglobin values below 11 gm/dl was considered anaemic. Statistical data were analysed.

RESULTS

The overall prevalence of anaemia was 71.2% with males having 5.2% higher than females. The majority of age group comprises 1 to ≤ 5 years (36.0%) and 83.3% of them were anaemic. The highest value of haemoglobin estimated was 14.8 gm/dl with the lowest value of 5.2 gm/dl. The mean haemoglobin level was 10.76 ± 1.21 gm/dl. 53.4% children were mildly anaemic. Both male and female children were affected more with mild anaemia than other types of anaemia.

CONCLUSION

Our results suggest that all the children should be screened for anaemia irrespective of age and sex as the prevalence is high. Early intervention and appropriate measures should be taken to prevent from anaemia and its associated diseases.

KEYWORDS

Anaemia, Children, Evaluation, Haemoglobin.

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INTRODUCTION: Childhood anaemia is an important health problem worldwide. Anaemia has serious consequences on child's growth and development. Haemoglobin is responsible for the constant supply of oxygen to the cells of all the tissues in the body. Ninety percent of the dry weight of a mature red cell is haemoglobin.^[1] Anaemia is defined as haemoglobin concentration below the range of values occurring in healthy person.^[2] According to World Health Organisation the cut-off value of haemoglobin to define anaemia is 11 gm/dl. Anaemia complicates a number of chronic diseases associated with infection, inflammation or tissue breakdown. In a longitudinal study show that children with anaemia in infancy continue to have poorer cognition, school achievement and more behavioural problems in later childhood.^[3] An infant with anaemia is at high risk of long term, even permanent impairment, regarding their mental and motor development. The prevalence of anaemia is

higher in developing countries when compared to the developed countries. Anaemia prevalence among young children is 43% and among school-going age 37.70%.^[4,5,6] In a cross sectional study at Kazakh children the prevalence of stunting associated with anaemia highlights the childhood nutritional status that are concern for a growing child.^[7] Routine screening of anaemia by haemoglobin estimation helps prevent the development of severe anaemia and management of anaemia associated diseases in children. Anaemia screening is recommended at 9 to 12 months of age for all infant populations with high rates of Iron deficiency by American Academy of Paediatrics.^[8] Centres for disease control and prevention also recommends anaemia screening for children from 2 to 5 years of children in low income group. The colour measurement technique for haemoglobin estimation is recommended by W.H.O. for adaptation in low source settings.^[9] The magnitude of the anaemia has been documented in pregnant women and infants, however there is lack of data on the prevailing occurrence of anaemia in children of Northeast India. Keeping this in view, the present study was undertaken to estimate the prevalence of anaemia among children of 0 to 12 years' age group and to assess its correlation to variables such as age, gender, haemoglobin values and magnitude of anaemia.

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MATERIALS AND METHODS:

Study Design: This was a cross sectional study carried out in Northeast India among children 0 to 12 years' age group attending paediatric outpatient department over a period of one year between October 2013 to September 2014. The study was conducted after getting approval from the institutional ethical committee. A written informed consent was obtained from the parents or caregivers of each child before enrolment in the study. Only those parents willing to participate are enrolled by sequential sampling. A sample size of 500 children were determined for a 95% confidence level and maximum marginal error of 0.02. Information on age of the children was collected from their parents. Children exposed or infected with human immunodeficiency virus and thalassemia trait were excluded from the study.

Procedure: The children were grouped according to the age. A sample of capillary blood was obtained from the fourth finger of left hand of each subject using a microlance and Sahli's micropipette. Haemoglobin estimation in gram per decilitre was done by Acid Haematin (Sahli's) method using a Haemoglobinometer. Mild anaemia was defined as haemoglobin level of 10 to 10.9 gm/dl, moderate anaemia as haemoglobin 7 to <10gm/dl and severe anaemia as haemoglobin less than 7 gm/dl. WHO standards were used to grade anaemia in children. The parents of the enrolled children were explained about the study and its outcome measures like treatment for anaemia and associated diseases were given.

STATISTICAL ANALYSIS: Data collected was entered in the computer and statistical analysis were done using Mean \pm SD and percentage. Student t test was used to compare the haemoglobin values of male and female children using SPSS software Version 22. Criterion for statistical significance was set at $p \leq 0.05$. The outcome of the age, gender, haemoglobin values and magnitude of anaemia were analysed.

RESULTS: A total of 500 children in the age group 0 to 12 years were studied. Participants consisted of 269 (53.8%) males and 231 (46.2%) females. The highest haemoglobin value estimated was 14.8 gm/dl and lowest value of haemoglobin was 5.2 gm/dl with mean (SD) haemoglobin in gm/dl of 10.76 ± 1.21 . It is apparent from Table 1 that majority of the children belongs to age group 1 to ≤ 5 years which comprises 36.0% and only 12.8% were in the age group below 1 year. 356 children were anaemic with blood haemoglobin values of less than 11 gm/dl. The overall prevalence of anaemia among the study population was 71.2%. The prevalence of anaemia among the male children (73.61%) was higher than female children (68.40%). Table 2 shows that female children have a significantly higher mean haemoglobin level as compared to males (p -value 0.000). The anaemia was graded according to WHO standards. The magnitude of anaemia among the study population is shown in Table 3. In this study 53.4% of children were mildly anaemic which was far higher than

moderate anaemia (16.6%). Table 4 shows that anaemia in children among the age group 1 to ≤ 5 years was higher than other age groups in the study population. In both the male and female children, mild anaemia was more common than the other types of anaemia.

DISCUSSION: The present study indicates that the prevalence of anaemia was 71.2% in the children of age group 0 to 12 years. According to the third National Family Health Survey, 71% of urban children are anaemic.^[10] This finding is similar with our study. Another study on prevalence of anaemia among urban school children of Punjab, by Verma et al, stated that the prevalence of anaemia in 5-15 years' age group was 51.5%.^[11] Among 5 to ≤ 10 years' age group in the current study the prevalence of anaemia (68.5%) was higher than the previous study. It is also observed that the prevalence of anaemia (77.7%) among tribal children of Mysore District in Karnataka was high.^[12] In the present study, the prevalence of anaemia among male children was higher than female children. This finding could be the reason that more number of male children are brought to our health care centre. In a study at Haiti (Ayoya MA et al), the prevalence of anaemia was slightly higher among boys (42.1%) than girls (35.7%) in the age group 6- 59 months old in 557 children.^[13]

The level of haemoglobin to define anaemia was taken as less than 11 gm/dl for the current study. WHO definition of haemoglobin level below 11 gm/dl was anaemic in children below 6 years of age.^[14] Study in a remote area of Australia by Hopkins RM et al also found that prevalence of anaemia in children 0-5 years were 20-60%.^[15] The result of the present study also shows that 83.3% of children was anaemic in the age group 1 to ≤ 5 years indicating widely prevalence of anaemia among these age group. In another study population (Sudhagandhi et al) for prevalence of anaemia, 52.88% were anaemic in children of 8-16 years age group.^[16] The result of our study shows similar findings that 56.8% was anaemic in children of 10-12 years age group. Among total children in the present study, 53.4% were mildly anaemic and only 1.2% were severely anaemic. [Table 3] These finding shows that mild form of anaemia is highly prevalent among children. Previous studies are also found that anaemia of varying degree in children are common in India. The present study shows that moderate anaemia (23.4%) was more common among children below 1 year of age. Late introduction of complementary food may be responsible for the present findings. In total population (500) of the present study, the prevalence of mild anaemia was higher than the moderate and severe anaemia in both the male and female children [Table 4]. This observation is important and suggest that low consumption of protein rich food and intestinal parasitic infection may contribute to the high prevalence of mild anaemia.

According to Mills et al, by using haemoglobinometer anaemia detection has 85% sensitivity and 94% specificity. They found that haemoglobinometer is an acceptable tool for anaemia detection where anaemia prevalence is more than 20%.^[17] Talapalliwar MR et al in their cross sectional

study on nutritional status and its correlates among tribal children (0-6 years) observed that the risk of malnutrition is higher (3.58 times) among anaemic children and this finding states that detection of blood haemoglobin levels are important and positively related to the height and weight for age in a growing child.^[18] In a resource poor setting, haemoglobin estimation using Sahli's haemoglobinometer can also be done to screen for anaemia in children. The prevalence of anaemia among children is high in developing countries due to poor dietary intake of calorie and iron. Other contributing factors include lack of awareness in food value, poverty, certain diseases, worm infestation and poor access to health services.^[19] The rising trend of consuming low calorie fast and junk food by the children could be highly responsible for the anaemia. The present study does not include various risk factors which can cause anaemia in children. However, early evaluation of haemoglobin level is necessary to prevent and treatment as well as monitoring of children with anaemia and its associated diseases.

CONCLUSION: Anaemia in children is a serious concern. Our study shows that, anaemia can affect children of various age group and both gender. The higher prevalence of anaemia among male children than female children demands further studies to find out the associated risks factor. Mild anaemia being more affected than both the moderate and severe types of anaemia, though anaemia related symptoms are not present, estimation of haemoglobin level to screen anaemia in children is highly recommended. Our study suggests that, there should be periodic screening of anaemia among children irrespective of age and gender. Appropriate corrective measures should be taken up to prevent anaemia and its associated diseases

with the participation of responsible health authority and at the level of policy makers.

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Age group	Total		Normal		Anemia	
	No.	%	No.	%	No.	%
< 1year	64	12.8	23	35.9	41	64.1
1 to≤5years	180	36.0	30	16.7	150	83.3
5 to≤10 years	168	33.6	53	31.5	115	68.5
10 to 12years	88	17.6	38	43.2	50	56.8
Overall	500	100	144	28.8	356	71.2

Table 1: Prevalence of anemia among the different age group in the study population

Gender	Mean (SD) Hb level in gm/dl	Mean difference	T- value	p- value
Male	10.70±1.37	-0.128	-1.172	0.000
Female	10.83± 0.99			

Table 2: t-test showing comparison of Hb level by gender

Females have a significantly higher mean Haemoglobin level as compared to males. P value less than or equal to 0.05 ($P \leq 0.05$) is considered statistically significant.

Haemoglobin (gm/dl)	Magnitude of anemia	Number	Percentage
≥11	No anemia	144	28.8
10 to <10.9	Mild anemia	267	53.4
7 to <10	Moderate anemia	83	16.6
Less than 7	Severe anemia	6	1.2

Table 3: Distribution of haemoglobin and magnitude of anemia among the study population

Gender/Age group	Normal		Mild Anaemia		Moderate Anaemia		Severe Anaemia	
	No	%	No	%	No	%	No	%
Male	71	26.4	147	54.7	48	17.8	3	1.1
Female	73	31.6	120	52	35	15.1	3	1.3
<1 year	23	35.9	25	39.1	15	23.4	1	1.6
1 - ≤ 5 years	30	16.7	114	63.3	33	18.3	3	1.7
5 - ≤ 10 years	53	31.5	88	52.4	26	15.5	1	0.6
10 – 12 years	38	43.2	40	45.5	9	10.2	1	1.1

Table 4: Prevalence of different grades of anaemia in relation to sex and age using WHO classification

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