ORIGINAL RESEARCH PAPER

Pediatrics

KEY WORDS: Anemia, Microcytic anemia, Iron deficiency anemia.

INCIDENCE OF ANEMIA IN CHILDREN AGED SIX MONTHS TO FIFTY-NINE MONTHS IN DMCH

Dr Vivekanand Paul Senior Resident, Department of Pediatrics, Darbhanga Medical College and Hospital, Laheriasarai, Bihar, India.

Dr. Ankur Agrawal* PG student,Department of Pediatrics, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India. * Corresponding Author

Dr N P Gupta Associate Professor, Department of Pediatrics, Darbhanga Medical College and Hospital, Laheriasarai, Bihar, India.

ABSTRACT

Objectives: The objective of the study were to determine Incidence of anemia in children aged six months to fifty-nine months in the region of northern Bihar.

Materials and methods: Data were collected from the children admitted in Darbhanga Medical Hospital, Laheriasarai. Blood sample were collected from the children at the time of admission.

Results: Out of 350 children, incidence of anemia in male children is 59.1% (130/220) and in female children is 61.5% (80/130). Incidence of anemia in 6 months to 12 months is 44 52.4%), in 13 months to 30 months incidence is 93 (67.4%), in 31 months to 48 months incidence is 45 (52.3%) and in 49 months to 59 months incidence is 28 (66.7%). Incidence of microcytic anemia is 115 (54.8%), macrocytic anemia is 20 (9.5%) and normocytic anemia is 75 (35.7%). Incidence of Iron deficiency anemia is 70 (60.9%), beta thalassaemia trait is 15 (13.1%), beta thalassaemia is 25 (21.7%) and undetermined is 5 (4.3%).

Conclusion: Incidence of anemia is high in children less than 59 months of age. Out of which incidence of iron deficiency anemia is higher than other microcytic anemia. Key strategy to prevent and control this public health problem is by raising awareness and providing health care education.

INTRODUCTION

Anemia, defined as a low blood hemoglobin (Hb) concentration, is one of the most common and widespread disorders in the world, affecting one-quarter of the world's population. It is a major public health problem in several countries, particularly common among preschool-aged children and women. According to the World Health Organisation (WHO), for under five children, the threshold Hb level for being anemic is less than 11.0 g/l[1]. According to the 2011 WHO report, anemia resulting from iron deficiency was one of the most important factors contributing to the global burden of diseases, and it increases morbidity and mortality in preschool-aged children and pregnant women. Globally, anemia affects 1.62 billion people, which correspond to 24.8% of the population[2]. It has been estimated that among children below five years of age, 12% are anemic in developed countries and 51% are anemic in developing countries[3]. Childhood anemia is a preventable condition, which has serious consequences including growth retardation, poor immune system and increased susceptibility to diseases and death and has severe socio-economic consequences for families and communities[4-7].

Anemia is associated with weakness, fatigue, reduced productivity, and inhibited immune function[8]. Several factors contribute to the occurrence of anemia and nearly half of (43%) the anemia cases in childhood are due to iron deficiency. The deficiency may result from inadequate dietary intake of iron, malabsorption of iron, an increased iron demand during rapid growth in children and chronic blood loss. Other causes of anemia include folate and vitamin B12 and A deficiencies, Malaria, intestinal helminths, viral infections, chronic disease, hemoglobinopathies, hemolysis, and bone marrow disorders[9-10].

Aim of this study to determine the incidence of anemia in children aged 6 months to 59 months in the admitted patients in DMCH, Pediatrics Department.

MATERIALS AND METHODS

The study was carried out in the Department of Paediatrics, Darbhanga Medical Hospital, Laheriasarai. A total of 150 children were selected from the hospital. Permission from the hospital authority and ethical committee was taken before conducting the study.

Children aged six months to fifty-nine months, who were admitted in the hospital due to any acute illness like acute respiratory tract infection, acute gastroenteritis, etc. were included in the study. A detailed informed consent was taken from the mothers whose children were included in the study.

Children's that were excluded from the study were those who have been suffering from chronic illness such as haematological and renal disorders, severe malnutrition, persistent diarrhoea and who received blood transfusion before admission due to any cause.

A detailed history was taken from mothers and thorough physical examination of the children was performed. Case history information included family history, birth history, socioeconomic history and detailed dietary history of children. Blood sample approx 2ml was collected by the venipuncture in the cubical fossa of each children. Blood was collected in the ethylenediamine tetra acetic acid (EDTA) coated vial. Complete blood count with peripheral smear of blood was done on each sample collected. Hemoglobin value (Hb), erythrocyte count and mean corpuscular volume (MCV) was evaluated by cell counter machine. Anemia was defined when Hb level was below <11 g/dL according to World Health Organisation (WHO). Normal value of MCV was taken according to age. Children were divided into two groups, children with anemia (Hb <11gm/dl) and children without anemia (Hb>11gm/dl). Anemia was labeled as mild (Hb 10-10.9gm/dl), moderate (Hb 7-9.9gm/dl), and severe (Hb <7 gm/dl)[1]. On the basis of MCV value and peripheral smear of blood anemia was classified as microcytic (low MCV), normocytic (normal MCV) and macrocytic (high MCV). If peripheral smear of blood show microcytic hypochromic RBC, further investigation for serum ferritin, routine and microscopic examination of stool, hemoglobin electrophoresis were performed. Laboratory tests results were communicated to the parents of children.

A p-value of <0.05 was considered as statistically significant.

RESULTS

A total of 452 children were screened during the study, out of which 350 children were included in the study. Overall 102 children were excluded from the study: 84 children because their refused to give consent; 18 children because of insufficient collection of blood. Out of 350 children that were included in the study, 210 (60%) children have anemia (Hb<11 gm/dl) while 140 (40%) children have normal hemoglobin concentration (Hb>11 gm/dl). In the study, it was found that out of 210 anemic children, 60 (28.6%) children were mild anemic, 140 (66.7%) children were moderately anemic and 10 (4.7%) children were severely anemic. In the study, out of 220 male children, 130 (59.1%) children were anemic and 90 (40.9%) children have normal hemoglobin level. Out of 130 female children, 80 (61.5%) children were anemic and 50 (38.5%) children have normal hemoglobin level. It was not found to be statistically significant (Proportion test, p-value: 0.65) (**Table 1**). In the study, 350 anemic children were divided into four age groups:6 months to 12 months 84 (25%) children, 13 months to 30 months 138 (39.4)% children, 31 months to 48 months 86 (24.6%) children and 49 months to 59 months 42 (12%) children. Out of 84 children of 6 months to 12 months, 44 (52.4%) children were anemic, which was not found to be statistically significant (Proportion test, p-value: 0.7). Out of 138 children of 13 months to 30 months, 93 (67.4%) children were anemic, which was found to be statistically significant (Proportion test, p-value: 0.0007). Out of 86 children of 31 months to 48 months, 45 (52.3%) children were anemic, which was not found to be statistically significant (Proportion test, p-value: 0.7). Out of 42 children of 49 months to 59 months, 28 (66.7%) children were anemic, which was not found to be statistically significant (Proportion test, p-value: 0.07) (**Table 2**). In the study, out of 210 anemic children, microcytic anemia was found in 115 (54.8%) children, macrocytic anemia was found in 20 (9.5%) children and normocytic anemia was found in 75 (35.7%) children.

Out of 115 microcytic anemic children, 70 (60.9%) childrenhave Iron deficiency anemia, 15 (13.1%) children have beta thalassaemia trait, 25 (21.7%) children have beta thalassaemia and 5 (4.3%) children were undetermined. Incidence of Iron Deficiency anemia among the total anemic children was 33.3% (70 out of 210) (**Table 3**).

Table 1: Sex distribution of children that were included in the study (n=350).

SEX	CHILDREN WITH ANEMIA		CHILDREN WITHOUT ANEMIA		P-value
	Number	Percentage	Number	Percentage	
MALE	130	59.1%	90	40.9%	0.65
FEMALE	80	61.5%	50	38.5%	

Table 2: Distribution of anemia in children according to age (n=350).

AGE	CHILDREN WITH ANEMIA		CHILDREN WITHOUT ANEMIA		P -value
	Number	Percentage	Number	Percentage	
6 months to 12 months (n=84)	44	52.4%	40	47.6%	0.7
13 months to 30 months (n=138)	93	67.4%	45	32.6%	0.0007
31 months to 48 months (n=86)	45	52.3%	41	47.7%	0.7
49 months to 59 months (n=42)	28	66.7%	14	33.3%	0.07

Table 3: Causes of microcytic anemia (n=115)

CAUSES OF MICROCYTIC ANEMIA	NUMBER OF CHILDREN	PERCENTAGE OF CHILDREN
IRON DEFICIENCY ANEMIA	70	60.9%
BETA - THALASSEMIA TRAIT	15	13.1%
BETA - THALASSEMIA	25	21.7%
UNDETERMINED	5	4.3%

DISCUSSION

In the present study, out of 350 children that were included the study, 210 children were anemic that is their hemoglobin level was <11gm/dl whereas 140 children were non anemic that is their hemoglobin level was >11gm/dl. Hence the incidence of anemia in children aged 6 months to 59 months was 60.

The incidence of anemia varies widely between the different countries. Different survey have shown that anemia is a severe problem among all age, population and geographic groups. The prevalence of anemia in India was 74.35% for 6-35 months age group, Nepal had 78% for 6-59 months age group and in Kazakhstan it was 73.7% for 0-23 months age group.[11]The prevalence of anemia in preschool children (0-4 yr) of WHO countries of Africa, southeast Asia and eastern Mediterranean were 67.6%, 65.5% and 46.7% cases respectively. The prevalence of anemia is much more lower in developed countries such as in America 29.3% and Europe 21.7%.[12]

In the study, we found that incidence of anemia also varies according to the level of Hemoglobin. Maximum number of children have moderate anemia among anemic children. Incidence of children having mild anemia was 28.6%, moderate anemia was 66.7% and severe anemia was 4.7%. In a study done in Nigeria showed that 70.5% (n=400) children had varying degrees of anemia. Among the anemic cases mild, moderate and severe anemia were 38.0%, 31.8% and 0.8% respectively. The most affected age group was 6-23 months (76.12%). This result was similar to study in Nigeria, where Onyemaobi et al found the most affected age group was 12-23 months (84.8%).[13]

In the study, we found that incidence of anemia in male children was 59.1% which is lesser than incidence of anemia in female children 61.5% which was different from the study done in Bangladesh by Stallkamp G, et al.[14] in the year 2006, where the incidence of anemia was more in boys compared to girls. This variations in the incidence of anemia among girls can be explained by poor health and poor access of health education and services towards girls.

In the study, it was found that incidence of anemia was more in 13 months to 30 months age group of children 67.4%, which was different from the results concluded from the study by Montalembert M et al.[15] in the year 1998. This variations in the incidence of anemia among different age group can be explained by poor access to the medical services.

In the study, it was found that incidence of anemia according to MCV was higher in microcytic anemia 54.8%, than macrocytic or normocytic anemia. Among microcytic anemia incidence of iron deficiency anemia was 60.9% which is higher than other causes of microcytic anemia. The undetermined cases were those who had serum ferritin level > 12 microgram/ L and Hb electrophoresis revealed normal value. Incidence of Iron Deficiency anemia among the total anemic children was 33.3% (70 out of 210).

CONCLUSION

From this study, it is concluded that Incidence of anemia is high in children less than 59 months of age. Out of which incidence of iron deficiency anemia is higher than other microcytic anemia. Therefore it is important to identify the

risk factors of Anemia in this age group and should be managed promptly. Key strategy to prevent and control this public health problem is by raising awareness and providing health care education.

REFERENCES

1. McLean E, Cogswell M, Egli I, Wojdyla D, De Benoist B. Worldwide prevalence of anemia, WHO vitamin and mineral nutrition information system, 1993–2005. Public Health Nutr. 2009;12(4):444–454. doi: 10.1017/ S13689 80008002401.
2. Steel N. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the global burden of disease study 2016. Lancet. 2017;390(10100):1151–1210. doi: 10.1016/S0140-6736(17)32152-9.
3. Maeyer E, Adiels-Tegman M. The prevalence of anemia in the world. World Health Stat Q. 1985;38:302-16.
4. Shaw JG, Friedman JF. Iron deficiency anemia: focus on infectious diseases in lesser developed countries. Anemia. 2011;2011:10. doi: 10.1155/ 2011/ 260380.
5. Kiguli S, Maitland K, George EC, Olupot-Olupot P, Opoka RO, Engoru C, Akech SO, Nyeko R, Mtove G, Reyburn H, et al. Anemia and blood transfusion in African children presenting to hospital with severe febrile illness. BMC Med. 2015;13:21. doi: 10.1186/s12916-014-0246-7.
6. Walker SP, Wachs TD, Gardner JM, Lozoff B, Wasserman GA, Pollitt E, Carter JA. Child development: risk factors for adverse outcomes in developing countries. Lancet. 2007;369(9556):145–57. doi: 10.1016/S0140-6736(07) 600 76-2.
7. Kikafunda JK, Lukwago FB, Turyashemererwa F. Anemia and associated factors among under-fives and their mothers in Bushenyi district, Western Uganda. Public Health Nutr. 2009;12(12):2302. doi: 10.1017/ S136898 000 90 0 5333.
8. Beard, J. L. (2001). Iron biology in immune function, muscle metabolism and neuronal functioning. Journal of Nutrition, 131, 568S–579S. discussion 580S.
9. Janus J, Moerschel SK. Evaluation of Anemia in Children. American Family Physician. 2010;81(12):1462–1471.
10. Lopez A, Cacoub P, Macdougall IC, Peyrin-Biroulet L. Iron deficiency anemia. The Lancet. 2016;387(10021):907–16.
11. Hall A, Bobrow E, Brooker S, Jukes M, Nokes K, Lambo J, et al. Anemia in schoolchildren in eight countries in Africa and Asia. Public Health Nutr 2001;4:749-56.
12. Benoist B, McLean E, Egli I, Cogswell, M. Worldwide prevalence of anemia 1993-2005: WHO Global Database on Anemia. Geneva: World Health Organization, 2008.
13. Onyemaobi G.A, Onimawo IA. Anemia Prevalence among Under – five Children in Imo State, Nigeria. Aust. J. Basic & Appl. Sci 2011; 5(2): 122-26.
14. Stallkamp G, Ached N, Keller H, The burden of anemia in rural Bangladesh: the need for urgent action. Sight and life 2006;3:16-21.
15. Montalembert M, Girot R. Les oligoelemements: le fer. Ricour G, Ghisolfi J, Putet G, Goulet O (eds). In: Traits de Nutrition Pediatrique. Paris, Maloine. 1996;193–207. Cited in: Cornet M. Prevalence of and risk factors for anemia in young children in Southern Cameroon. Am J Trop Med Hyg. 1998;58(5):606-11.