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Assesment of prevalence of anemia in children from Bihar region

Dr. Ashok Kumar[1], Dr. Ramjee Prasad Gupta[2], Dr. BP Jaiswal[3]
[1] Senior Resident, Department of Paediatrics, NMCH, Patna, Bihar, India
[2] Assistant Professor, Department of Paediatrics, NMCH, Patna, Bihar, India
[3] Associate Professor, Department of Paediatrics, NMCH, Patna, Bihar, India
[*] Corresponding Author: Dr. Ramjee Prasad Gupta

Abstract
Anemia has a variable impact on physical development and children show poor attentiveness, memory and academic performance. Children who suffer from anemia have delayed psychomotor development and impaired performance. Hence, due to absence of recent and comprehensive systemic review about prevalence of anemia in school-age children in our region. And also in order to understand and explain the differences in various studies with age, sex, residence, and study period. The present study was planned to study the prevalence of anaemia in the selected population.
The 320 children's admitted to paediatric department in, NMCH Patna from Jan 2018 to July 2018 was registered in the present study. From that 24 Childs were found anaemic. The children's in the age group of not less than 6 months and up to the 12 years of age were considered for the study. All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.
The problem of Anemia, especially mild and moderate Anemia is common among the children in Bihar region. Thus, adequate intervention should be designed by policy makers, health care community, and researcher to alleviate the problem. Weekly iron supplementation for school children considered for primary schools. Fortification of foods is another strategy which could be considered for preventing iron deficiency among.

Keywords: incidence, prevalence, anaemia, children

Introduction
Anemia is when the level of healthy red blood cells (RBCs) in the body becomes too low. This can lead to health problems because RBCs contain hemoglobin, which carries oxygen to the body's tissues. Anemia can cause a variety of complications, including fatigue (tiredness) and stress on the body's organs.
Human blood contains a red pigment called haemoglobin which carries oxygen into the lungs and to different parts of body. For making haemoglobin red, strong and healthy, it chiefly needs iron, folic acid, vitamin C, protein and vitamin B12 – these are essential nutrients which our body cannot make on its own and need to be taken in our food, deficiency of these nutrients in diet leads to decreased concentration of haemoglobin making it thin and pale in colour. When haemoglobin concentration is lower than the levels considered normal for the persons age and sex groups this is called Anaemia. Decreased haemoglobin concentration leads to less supply of oxygen to different parts of the body which results in the malfunctioning of body cells and organic systems. Out of all these nutrients, Anaemia due to deficiency of iron is more common. Among all Anaemia, iron deficiency Anaemia is found in more than 50 per cent of the cases. Anaemia, like fever is a manifestation, not a disease, the most common cause being iron deficiency. The other causes are deficiency in other vitamins and minerals such as vitamin A, B, folic acid and zinc, malaria and worm infections.
There are many types of anemia [1]:

- **Iron deficiency anemia:** Too little iron in the blood. Iron is needed to form hemoglobin. This is the most common cause of anemia.
- **Megaloblastic anemia:** Red blood cells are too large. One type of megaloblastic anemia is pernicious anemia. In this type, there is a problem absorbing vitamin B_{12}, important to making red blood cells.
- **Hemolytic anemia:** Red blood cells are destroyed. There are many different causes, such as serious infections or certain medications.
- **Sickle cell anemia:** An inherited type of anemia with abnormally shaped red blood cells. It is a type of hemolytic anemia.
- **Cooley's anemia (thalassemia):** Another inherited type of anemia with abnormal red blood cells.
- **Aplastic anemia:** Failure of the bone marrow to make blood cells

India has the largest number of young people aged 10-19 years in the world – 243 million out of 1.2 billion. This age group – referred as adolescents - comprise one-fourth of India's population and are key drivers of India's future

economic growth. However, 56 per cent of girls and 30 per cent of boys in the age group of 15-19 years in India suffer from Anaemia. This means that 1 out of 2 young girls and 1 out of 3 young boys are anemic. In Haryana, 58 per cent of adolescent girls and 26 per cent of adolescent boys are anemic. Anaemia is eroding the mental and physical capacity of young boys and girls, retarding their physical development, making them fatigued and breathless, and adversely affecting their memory and energy to perform daily tasks. Adolescent marriage and pregnancy is still prevalent in India, particularly rural India. Anaemia in girls during pregnancy is increasingly their risk to give birth to babies with low birth weight and resulting in complications during birth. Research shows that after the first year of life, adolescence is the second highest growth spurt period. Adolescents if fed and cared well, gain up to 50 per cent of their adult weight, more than 20% of their adult height, and 50% of their adult skeletal/bone mass during this period. A country whose young boys and girls should have been marching ahead get robbed of their capacity to achieve their physical and mental potential due to Anaemia.

Iron stored in the body is utilized when the amount of iron required by the body is more than that absorbed from the intestine. If this condition continues longer, then iron stores become depleted and deficiency of iron develops in blood. Generally Anaemia develops due to less intake of iron in our food or hindrance in the absorption of iron from food due to any reason. Besides this, Anaemia results when there is blood loss during heavy, delivery injury and surgery and there are Hook worms/round worms' in intestine and in case of Malaria, during which breakdown of hemoglobin takes place.

Simple exercises like playing games, walking, climbing stairs etc. make an anaemic person feel out of breath and tired. Even small work at home can lead to tiredness. reduces the ability to memorise and learn. You fall sick often and cannot concentrate while working or remember what you have learnt. This reduces academic success. Children with have more than twice the risk of scoring below average in math tests. Anaemic children often fall sick leading to absenteeism from school. in girls during pregnancy is associated with giving birth to anaemic as well: it's a vicious cycle, low birth weight babies and affecting their own survival during delivery [2].

Anemia is a public health problem both in developed and developing countries, including India. The causes of anemia are multifactorial. Iron deficiency is the primary cause of anemia which results iron-deficiency anemia (IDA). However, it also coexists with malaria and parasitic infection. Iron is an essential micronutrient and major cause of anemia, intrinsically found in every cells of human body and has several metabolic function including hemoglobin transport and storage, DNA synthesis, electron transport, and energy production.

Childhood anemia is a condition where a child has an insufficient hemoglobin (Hb) level to provide adequate oxygen to the body tissues. For children between 6 and 59 months (generally referred to as under-fives), the threshold Hb level for being nonanemic is 11.0 grams per deciliter (g/dL). Anemia has numerous potential etiologies. Followed by acute blood loss and heredity or acquired diseases, the most common cause of anemia in young children is low consumption and absorption of iron-rich foods (i.e., meat and meat products) [3].

Anemia has a variable impact on physical development and children show poor attentiveness, memory and academic performance. Children who suffer from anemia have delayed psychomotor development and impaired performance; in addition, they experience impaired coordination of language and motor skills, equivalent to a 5-10-point deficit in intelligence quotient. Anemia is associated with socioeconomic, biological, environmental and nutritional factors [4].

Hence, due to absence of recent and comprehensive systemic review about prevalence of anemia in school-age children in our region. And also in order to understand and explain the differences in various studies with age, sex, residence, and study period. The present study was planned to study the prevalence of anaemia in the selected population.

Methodology

The 320 children's admitted to paediatric department in, NMCH Patna from Jan 2018 to July 2018 was registered in the present study. From that 24 Childs were found anaemic. The children's in the age group of not less than 6 months and up to the 12 years of age were considered for the study. All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Hb concentration was estimated as per Cyanmethaemoglobin method [7]. As anemia is classified into three degree according to WHO; mild, moderate and severe. Hb cut-off values of anemia for children below 6 years were 10.0-10.9 g/dl (mild), 9.0-9.9 g/dl (moderate) and < 9.0 g/dl (severe). Hb cut- off of anaemia for children 6-12 years old were 11.0-11.9 g/dl (mild), 10.0-10.9 g/dl (moderate) and < 10.0 g/dl (severe) [8].

Following are the inclusion and exclusion criteria for the enrolled study group.

Inclusion Criteria

- Children in the age group of 6 months to 5 years;
- Those children with hemoglobin level less than 11 gm/dl;
- Those children with serum ferritin level less than 12µg/L

Exclusion Criteria

- Children with haemolytic anemia and bleeding diathesis
- Children with chronic disease
- Children with anemia secondary to leukaemia, aplastic anemia.

Results & Discussion

The data from the enrolled childrens were collected and presented as below. The higher prevalence of Anemia in preschool children may be attributed to poor maternal iron stores during pregnancy and lactation, rapid growth, delayed initiation of complementary foods and poor dietary intake of iron.

Table 1: Demographic Parameters

Variables	Groups	No. of Cases
Gender	Male	113
	Female	207
Education of Father	Illiterate	21
	Literate	299
Education of Mother	Illiterate	45
	Literate	275

Table 2: Age group and No of Cases

Age	Number of Cases	Positive Cases	Positive Cases Total
6 month to 2 year	38	3	14
2 to 3 years	59	6	
3 to 6 years	42	5	
6 to 9 years	82	6	10
9 to 12 years	99	4	
Total	320	24	24

Table 3: Distribution of Anemia based in Hemoglobin Levels

Age	Number of Anaemic Cases	Total
Below 6 years		13
10.0 – 10.9 g/dl (mild)	6	
9.0 – 9.9 g/dl (moderate)	4	
< 9.0 g/dl (severe)	3	
Above 6 years		11
11.0 – 11.9 g/dl (mild)	5	
10.0 – 10.9 g/dl (moderate)	3	
< 10.0 g/dl (severe)	3	
Total	24	24

According to WHO, anemia is a public health problem only when the prevalence exceeds 5% of the population. The WHO classification for mild, moderate, and severe is when its prevalence exceeds 5, 20, or 40%, respectively [5]. Thus, the meta-analysis revealed moderate prevalence of anemia among school going children in Ethiopia. According to the WHO definition, five articles reported mild prevalence of anemia, seven articles reported moderate prevalence of anemia, and only one article reported severe prevalence of anemia. According to this review, anemia was a major public health problem for all population included in this study.

The World Health Organization reported that it is impossible to supply enough iron from unmodified plant-based complementary foods to meet the recommended daily intake of iron for under-fives without adding animal products such as liver, fish, beef, and eggs. Apart from other causes of anemia like blood loss, diseases, vitamin A, and folate deficiency [6], multivariate analysis revealed that, in our population, poor feeding practices especially nonconsumption of iron-rich foods (i.e, meat, vegetables, and fruits) were significantly associated with the presence of childhood anemia. Meat and/or meat-containing infant foods were rarely (12.6%) consumed by the study subjects.

The population studied follows the current trend of reduced malnutrition (8.2%) and increased incidence of obesity (6.2%). The increase in obesity in the population is a result of a nutritional and epidemiological transition experienced by different countries, including Brazil [7]. Although anemia was found predominantly in underweight children, it was also found in overweight children. A lack of vitamins and minerals is commonly observed in both of these conditions. The diet of obese or overweight children is often characterized by excessive calories and insufficient intake of vitamins and minerals. In children with some degree of malnutrition, in addition to the mineral deficiency, there is also a calorie and protein deficiency. Osório *et al*. also found a higher prevalence of anemia in malnourished children aged between 6 and 59 months in Pernambuco [8]. However, other studies, such as that of Neumann *et al*., which focused on under three-year-old children in southern Brazil, found no association [9].

Anemia was, to a certain extent, associated with the reason for hospitalization. Anemia was most common in children suffering from respiratory tract diseases, followed by gastrointestinal diseases, those with other types of infection and finally non-infectious diseases. Respiratory tract diseases possibly require greater utilization of hemoglobin both due to the infectious process and increased respiratory effort, whereas gastrointestinal diseases lead to blood loss in feces and vomit or by degradation by parasites. Lima *et al*. reported a higher prevalence of anemia in infants with infectious diarrhea [10]. The diseases occurring in the study population raised questions about functional iron deficiency, which occurs when sufficient iron is not released to meet the normal hemoglobinization of red blood cells, either because of an absence of iron stores (iron-deficiency anemia) or by blocking iron homeostasis (anemia of inflammation). Anemia of inflammation, which is common in cases of inflammation and/or infection, is an immune-mediated process in which cytokines and cells of the reticuloendothelial system induce changes that interfere in different erythropoiesis pathways leading to anemia [11].

Overall high prevalence rate of anemia among the under-fifteen year old children was associated with early introduction of nutritionally poor complementary foods and lack of exclusive breastfeeding for the first 6 months of life. Introduction of nutritious complementary foods, such as iron-fortified cereals and meat/meat products, could have highly reduced the prevalence rate of anemia among the children.

Limitations of study of this study were: Sample size in the present study is small and need more sample size reduce bias. Long-term follow up is necessary in iron deficiency patients to record long term neurodevelopmental outcome. Underlying diseases may be the contributing factors for iron deficiency anemia in our patients; detailed etiological diagnosis was not made because of lack of investigation facilities

Conclusion

The problem of Anemia, especially mild and moderate Anemia is common among the children in Bihar region. Thus, adequate intervention should be designed by policy makers, health care community, and researcher to alleviate the problem. Weekly iron supplementation for school children considered for primary schools. Fortification of foods is another strategy which could be considered for preventing iron deficiency among.

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