

Original Research Article

Anemia in pediatric patients under five years old: A cross-sectional study

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Abstract: Anemia is considered the most prevalent nutritional deficiency globally, affecting about a quarter of the world population, especially children. This study was done to study the prevalence of anemia in child under five years of age. This cross-sectional study was carried out including of preschool children aged from 6 months to 5 years. Hemoglobin levels were measured to diagnose anemia (hemoglobin <11.0 g/dL) and data were collected on independent variables such as age, sex, area of residence (urban or rural), daycare center enrollment, birth weight, breastfeeding history, and maternal anemia during pregnancy. Anemia in the particular region was ranges from 29.7% to 25.9 % in 3 consecutive years. No significant differences were found in anemia prevalence between boys and girls. Prevalence of anemia was higher in rural areas than in urban areas. Because of the severity of the public-health problem and the potential threat to health, survival and development of present and future generations, the prevention and the control of anemia should be given immediate priority in the health and nutrition sectors.

Keywords Anemia, Health, Children

INTRODUCTION:

Anemia is considered the most prevalent nutritional deficiency globally, affecting about a quarter of the world population, especially children and women of reproductive age. In children, anemia can negatively affect cognitive development, school performance, physical growth, and immunity [1].

Anemia refers to a state in which the level of hemoglobin in the blood is below the normal range appropriate for age. Anemia in childhood is defined as a hemoglobin concentration below established cut off levels. Healthy newborn infants have a total body iron of 250 mg, which is obtained from maternal sources. Infants consuming cow milk have a greater incidence of iron deficiency because bovine milk has a higher concentration of calcium, which competes with iron for absorption. Subsequently, growing children must obtain approximately 0.5 mg more iron daily than is lost in order to maintain a normal body concentration of 200 mg. Inadequate dietary iron, iron absorption and intense exercise, along with blood loss and parasitic infestations, are some etiologies of Iron Deficiency Anemia [2-4].

Iron deficiency is the commonest form of malnutrition worldwide and according to the World Health Organization affects 43% of the world's children. Deficiency may be due to inadequate dietary intake of iron, low level of absorption because of small bowel pathology, increased physiological requirements during rapid growth in infancy and adolescence and chronic blood loss usually from the gastrointestinal or urinary tracts or because of menorrhagia in adolescent girls. Iron-deficiency anemia is a major nutritional problem throughout the world and leads to serious health problems, such as poor cognitive and motor development and behavioral problems, in children [5].

Anemia impairs normal development in children and it constitutes a major public health problem in young children in the developing world with wide social and economic implications. Thus, decreased physical exercise tolerance and intellectual performance have been associated with mild anemia, which may lead to a slowdown of growth in children [6].

MATERIALS AND METHODS:

This cross-sectional study was carried out including of preschool children of Igatpuri village and Nasik, (district- Nasik, Maharashtra, India) aged from 6 months to 5 years. Hemoglobin levels were measured to diagnose anemia (hemoglobin <11.0 g/dl) and data were collected on independent variables such as age, sex, area of residence (urban or rural), daycare center enrollment, birth weight, breastfeeding history, and maternal anemia during pregnancy.

Hemoglobin measurement:

Blood was collected by venous puncture. Testing was done using sahli's hemoglobinometer. All the readings were collected, tabulated and analyzed using IBM SPSS software version 20.

RESULTS:

Anemia in the particular region was ranges from 29.7% to 25.9 % in 3 consecutive years. Most of the cases were having mild anemia. Prevalence was higher in children aged from 6 to 23 month than those aged from 22 to 60 months. No significant differences were found in anemia prevalence between boys and girls. (Student's t test, $p > 0.001$) (Table 1 and 2). Prevalence of anemia was higher in rural areas than in urban areas. (Student's t test, $p < 0.001$) (Table 3)

Table 1: Variables considered for the study.

Variable	Category
Age group	6-11 12-23 24-60
Sex	Male Female
Area of residence	Urban Rural
Anemia	Yes: Hb < 11 g/dl No: Hb > 11 g/dl
Severity of anemia	Severe: Hb < 7 g/dl Moderate: Hb 7-10 g/dl Mild: Hb 10-11 g/dl

Table 2: Comparison of the boys and girls prevalence of anemia status

Category	Prevalence of anemia	T value	P value
Boys	26.4	0.012	$p > 0.001$
Girls	26.8		

Table 3: Comparison of the urban and rural prevalence of anemia status

Category	Prevalence of anemia	T value	P value
Urban	22.4	4.3234	$P < 0.001$
Rural	26.8		

DISCUSSION:

Anemia is considered the most prevalent nutritional deficiency globally, affecting about a quarter of the world population, especially children and women of reproductive age. In children, anemia can negatively affect cognitive development, school performance, physical growth, and immunity. Nowadays, the changing nutritional scenario of children less than five years of age has been evaluated optimistically based on results from national surveys in recent decades, revealing a tendency towards dramatic reductions in the prevalence rates of chronic under nutrition for this age group in all regions of the country. This trend has been attributed to improvements in education levels and family socioeconomic conditions, as well as public investments in infrastructure, health, and sanitation. Nevertheless, similar improvements have not been observed in relation to child anemia. According to recent studies, about one-fifth of children under five years of age are anemic [1, 7].

Its etiology in developing countries is multifactorial: thus, the most important risk factors need to be identified for prevention strategy. Anemia is commonly associated with nutritional deficiencies such as iron deficiency, the main factor responsible for microcytic anemia, while folate or vitamin B12 deficiencies are responsible for macrocytic anemia. Similarly, parasitic diseases such as malaria and ankylostomiasis have been reported to lead to a high prevalence of anemia during childhood. Sickle cell disease has been also recognized as an important risk factor for anemia in sub-Saharan countries. However, the relative contributions of these etiologies remain unclear [6].

The causes of anemia are often multifactorial and are interrelated in a complex way. First, the relative importance of each factor — for example, hookworm or malaria — varies in different settings. Anemia may be chronic — for example, secondary to iron deficiency, infection with human immunodeficiency virus (HIV), or intestinal worms — or it may be acute, owing to a sickle-cell crisis or Plasmodium falciparum infection, or chronic anemia may be acutely exacerbated. The situation is complicated further because anemia in childhood can result not only from events in childhood but also from maternal iron deficiency and anemia, which are associated with impaired fetal development and iron-deficient and anemic babies. Socioeconomic status may also affect the risk of anemia by affecting nutritional status, family size, and birth interval, as well as intensifying problems of affordability and accessibility of preventive and curative measures [8].

Causes of anemia can be multifactorial and often coincide, but the primary cause is a diet with inadequate iron sources (quantitatively and

qualitatively); iron deficiency causes an estimated 50% of anemia cases worldwide. Iron is an essential mineral in basic neural processes such as myelination, production of neurotransmitters, and energy metabolism. Fetal iron stores accumulate in the third trimester of pregnancy. Iron content is directly proportional to body mass, so newborns with low birth weight have less total iron available. Hence the importance of monitoring iron status during pregnancy and ensuring that delivery procedures avoid premature clamping of the umbilical cord to prevent iron deficiency. Rapid neural development occurs in the first year of life, when morphological; biochemical and bienergetic changes can affect all central nervous system functions. Iron is critical at this stage for neurogenesis and cell differentiation in various areas of the brain [9-11].

WHO has developed a classification system to facilitate international comparisons of anemia as a public health problem? The problem is considered severe if anemia prevalence is $\geq 40\%$, moderate from 20% to 39.9%, and mild from 5% to 19.9%. In many countries, iron-deficiency anemia is the main specific nutritional problem, classified as moderate in children aged < 5 years [11]. Since 1987, population-level and targeted interventions have been implemented in to reduce iron deficiency and iron-deficiency anemia. It has been shown that fortifying foods with iron constitutes one of the main cost-effective approaches to anemia prevention. Many Latin American countries use food fortified with iron and other micronutrients, promoting consumption in specific population groups such as children [8, 11, 12].

CONCLUSION:

Because of the severity of the public-health problem and the potential threat to health, survival and development of present and future generations, the prevention and the control of anemia should be given immediate priority in the health and nutrition sectors particularly preschool children who are not currently the target of anemia-prevention.. Further studies are needed to consider micronutrients status, parasite infestation, hereditary disorders, and environmental pollutants.

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