

Prevalence and Causes of Anemia in Six to Sixty Months Old Children: A Cross-Sectional Study at Kathmandu Medical College and Teaching Hospital

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Introduction

Anemia is a public health problem in both developing and industrialized countries. About 3.5 billion persons are affected by anemia in developing countries¹. In most cases, anemia is caused by iron deficiency, although a smaller proportion is due to deficiencies of other micronutrients such as folate and Vitamin B₁₂. Other diseases causing blood loss, chronic diarrhea and parasitic infections such as filariasis may also result in anemia. Anemia adversely affects health, cognitive development, school achievement and work performance.

The presence of anemia in children under five years of age is of particular relevance because it negatively impacts mental development and future social performance. Children suffering from iron deficiency anemia during their first two years of life have slower cognitive development and poorer school performance and work capacity in later years². Iron deficiency anemia has also been associated with a diminished ability to fight infections by impairing cell-mediated immunity, resulting in greater rates of morbidity due to acute infections³. Growth and physical work capacity, especially endurance exercise, are also negatively affected by iron deficiency anemia⁴.

Materials and Methods

This was a prospective hospital based cross-sectional study done in Kathmandu Medical College and Teaching Hospital, Sinamangal, Kathmandu, Nepal over a period of 10 months from March to December

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Abstract

Introduction: Anemia is one of the most common problems in children, especially in the developing countries. Nutritional anemia is associated with impaired performance of a range of mental and physical functions in children. This study was conducted to evaluate the prevalence and possible causes of anemia in children attending tertiary care center in Nepal. **Material and Methods:** This was a prospective hospital based cross-sectional study done at Kathmandu Medical College and Teaching Hospital, Kathmandu, Nepal over a period of 10 months from March to December 2012. Children between the age group of 6 months to 60 months attending the Paediatric Out-Patient Department were randomly selected. The haemoglobin concentration was measured with an Automated Haematology Counter (Sysmex, Japan) following the manufacturer's instructions. Anemia in children is defined as a hemoglobin level less than 11 gm/dl. **Results:** There were 500 children enrolled in the study, out of which 191 (38.2%) were found to be anemic. Mild anemia was observed in 31.2%, moderate in 6.6% and severe in 0.4%. The commonest age group affected was between 24 months to 35 months old children. Anemia was more common in female children (41.9%) compared to males (35.8%). 118 anemic children were further investigated for the cause of anemia and 103 (87.3%) had iron deficiency anemia. **Conclusion:** This study reflects that prevalence of anemia still remains high and iron deficiency is the leading cause of nutritional anemia in children. Timely intervention can both prevent and treat childhood anemia.

Key words: Anemia, Children, Iron deficiency, Nepal

2012. Children between the age group of 6 months to 60 months attending the Paediatric Out-Patient Department were randomly selected. Relevant history was taken and a physical examination was done in all

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the children. Children with chronic illnesses, previously diagnosed to have anemia, recent blood loss and those on iron therapy were excluded. Venous blood was collected by trained laboratory technicians. The haemoglobin concentration was measured with an Automated Haematology Counter (Sysmex, Japan) following the manufacturer's instructions. Anemia in children is defined as a hemoglobin level less than 11 gm/dl. Severity of anemia is classified according to the standard set by World Health Organization (WHO) as: Severe anemia- less than 7.0 gm/dL, Moderate anemia- 7.0 to 8.9 gm/dL, Mild anemia- 9.0 to 10.9 gm/dL. Those found to be anemic were investigated with RBC indices and Peripheral blood smears (done by the Pathologist on duty). Some required further investigations such as Serum iron profile, Reticulocyte level, Stool examination depending on the suspected cause of anemia. Bone marrow examination was not done in any of the subjects.

Results

In this study, 500 children between 6 months to 60 months of age were randomly selected, out of which 191 (38.2%) were found to be anemic. Out of these 191 children, mild anemia was seen in 31.2%, moderate anemia in 6.6% and severe anemia in 0.4% of children as shown in Figure 1. The commonest age group affected was 24 months to 35 months old (67.2%) as represented in Figure 2.

There were a total of 302 male children (60.4%), out of which anemia was detected in 108 of them. 198 were females (39.6%) and 83 had anemia (Figure 3). Females were more likely to be anemic than males (41.9% v. 35.8% respectively).

Only 118 (61.8%) of the children who suffered from anemia were further investigated for the possible cause of anemia, as 24 of the parents declined investigations and 49 children were lost for follow-up. Amongst these 118 children, 103 (87.3%) were found to have iron deficiency anemia. Hookworm infestation (*Ancylostoma duodenale*) was seen in 3 children.

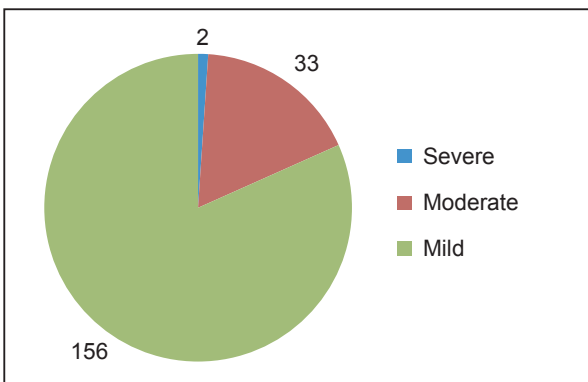


Fig 1: Pie diagram showing Degree of Anemia in the Anemic Population

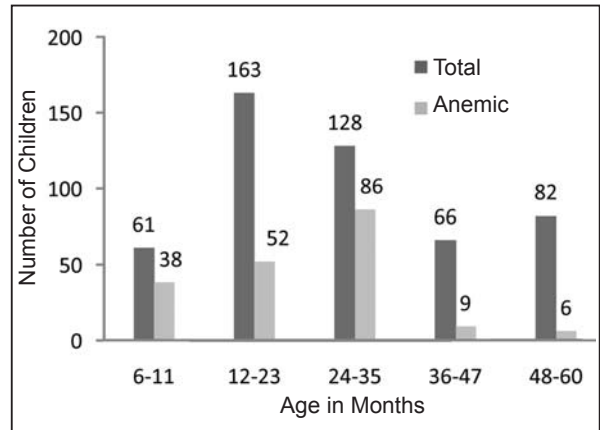


Fig 2: Graph showing Age distribution of Anemic Children

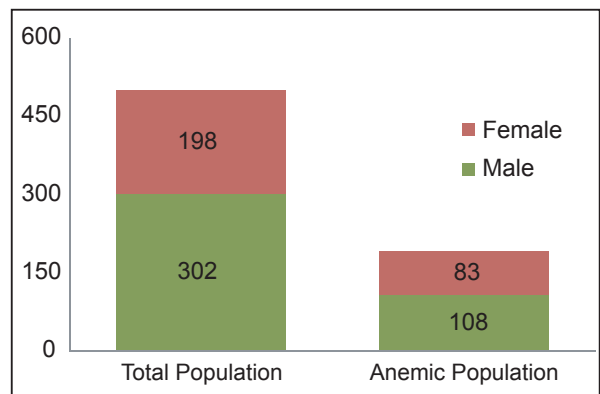


Fig 3: Graph showing gender distribution of Anemia Cases

Discussion

Anemia is a global public health problem and is more prevalent in young children. Anemia is caused by a number of conditions, often in combination, however the primary cause remains to be iron deficiency. WHO Global Database on Anemia states 47.4% of pre-school age children to be anemic⁵. The prevalence of anemia in children of Nepal was first studied in 1975⁶ when the first national representative study on nutritional status was done.

The overall prevalence of anemia in this study was 38.2%, out of which 31.2% were mildly anemic, 6.6% had moderate anemia and only 0.4% suffered from severe anemia. A similar study done at Kathmandu Medical College and Teaching Hospital in the past reported 46% children in the same age group to be anemic⁷.

In this study, we also found that anemia was more prevalent in females. 41.9% of the females had anemia, whereas the prevalence in males was 35.8%.

In this study, the commonest age group affected was 24 months to 35 months old (67.2%) whereas the least affected were children between 48 months to 60

months (7.3%). In 1998, micronutrient status study was done which covered children, pregnant and non-pregnant women from all the ecological zones of Nepal. They have found that anemia reaches over 80% in the second half of infancy gradually declining to 59% by five years⁸.

This study further investigated on 118 (61.8%) of the anemic children for the possible cause of anemia and 103 (87.3%) were found to have iron deficiency anemia. Iron deficiency is the most common cause of anemia in young children. Anemia tends to develop when iron deficiency is severe and prolonged. In a given population, individuals with iron deficiency or depleted iron stores may number two to five times the number of individuals with anemia⁹.

A country like Nepal requires surveillance programs to identify at-risk populations and to monitor interventions to ensure utilization of resources¹⁰. Furthermore, WHO has proposed that if the prevalence of anemia in a region is between 5% and 20%, appropriate interventions based on food diversification, food fortification, iron supplementation and controlling infectious diseases should be considered¹¹.

Conclusion

Childhood anemia is treatable and preventable. The resource-limited regions of the world bear the greatest burden of anemia. This study indicates that prevalence of anemia remains high in children in the age group of 6 to 60 months. Also, female children happen to suffer more from anemia. Result of this study is also consistent with the finding that iron deficiency is the leading cause of nutritional anemia in childhood. Prevention of anemia can be brought through awareness programs and campaigns.

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References

1. United Nations Administrative Committee on Coordination Nutrition (ACC/SCN) 4TH Report on the world nutrition situation. Nutrition throughout the life cycle. Sub-Committee on Geneva:ACC/SCN, 2000.
2. Sayed NE, Gad A, Nofal L, Netti G. Assessment of the prevalence and potential determinants of nutritional anemia in Upper Egypt. *Food Nutr Bull* 1999;20:417-421.
3. Freire WB. La anemia por deficiencia de hierro, estrategias de OPS/OMS para combatirla. *Salud Publica Mex* 1998;40:199-205.
4. Beard JL, Tobin BW. Iron status and exercise. *Am J Clin Nutr* 2000;72(Suppl):594S-597.
5. Worldwide prevalence of anemia 1993-2005; *WHO Global Database on Anemia*, 2008:7.
6. HMG/USAID (1975), Nepal Nutrition Status Survey, Kathmandu, Nepal.
7. Bajracharya BL, Manandhar DS, Baral MR. Hemoglobin status in children in the age group 6 to 60 months. *JNMA* 2006;45(161):190-195.
8. Ministry of Health, Child Health Division, HMG/ Nepal, New Era, Micronutrient initiative, UNICEF Nepal and WHO. Nepal. Micronutrient Status Survey 1998. Kathmandu, Nepal.
9. Singla PN, Agarwal KN, Singh RM, Reddy EC, Tripathi AM, Agarwal DK. Deficiency anemia in pre-school children – Estimation of prevalence based on response to hematinic supplementation. *J Trop Pediatr* 1982;26:239-42.
10. Stoltzfus RJ. Rethinking anaemia surveillance. *Lancet* 1997;349(9067):1764-1766.
11. Iron deficiency anaemia. Assessment, prevention and control. A guide for programme managers. Geneva, World Health Organization, 2001, WHO/ NHD/01.3.