INTERNATIONAL MULTI DISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT

eISSN 2394-6334 Impact factor: 7,854 Volume 12, issue 09 (2025)

NUTRITIONAL ANEMIA IN CHILDREN: CLINICAL FEATURES, DIAGNOSIS, AND MANAGEMENT STRATEGIES

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Abstract: Nutritional anemia is one of the most prevalent pediatric health problems worldwide, particularly in developing countries. Iron deficiency remains the leading cause, though deficiencies of folic acid, vitamin B12, and other micronutrients also contribute. This article reviews the clinical characteristics, diagnostic methods, and management approaches for nutritional anemia in children. Findings highlight the importance of early detection, dietary interventions, supplementation, and preventive strategies in reducing the burden of childhood anemia.

Keywords: pediatrics, nutritional anemia, iron deficiency, vitamin B12 deficiency, child health, hematology

Introduction

Anemia is defined as a reduction in the hemoglobin concentration of blood below normal for age and sex, leading to impaired oxygen transport. It is one of the most common nutritional disorders among children worldwide. According to the World Health Organization, nearly 40% of children under five years suffer from some form of anemia, with iron deficiency accounting for the majority of cases.

Children are especially vulnerable due to rapid growth, high nutritional requirements, frequent infections, and inadequate dietary intake. In low- and middle-income countries, contributing factors include poor nutrition, parasitic infestations, recurrent infections, and lack of maternal health care during pregnancy. Nutritional anemia not only impairs physical growth and cognitive development but also weakens immunity, making children more susceptible to infections.

The main types of nutritional anemia in pediatrics include iron deficiency anemia, folic acid deficiency anemia, and vitamin B12 deficiency anemia. Clinical features range from mild fatigue and pallor to growth retardation, developmental delay, and behavioral disturbances. Understanding the pathophysiology, risk factors, and diagnostic criteria of nutritional anemia is essential for its timely management and prevention.

Methods

This article is based on a comprehensive literature review of studies published between 2014 and 2025, using PubMed, Scopus, and WHO databases. Keywords included “nutritional anemia in children,” “iron deficiency,” “vitamin B12 deficiency,” and “pediatric hematology.” Clinical guidelines from the American Academy of Pediatrics (AAP) and WHO recommendations on childhood anemia were analyzed.

Results

Clinical Features

Most children with nutritional anemia presented with generalized weakness, pallor, loss of appetite, irritability, and delayed psychomotor development. Severe cases were associated with tachycardia, shortness of breath, glossitis, brittle nails, and pica (craving for non-nutritive substances such as clay or ice). Vitamin B12 deficiency cases also demonstrated neurological symptoms, including paresthesia and delayed speech development.

Diagnostic Findings

Laboratory studies confirmed microcytic hypochromic anemia in iron deficiency, megaloblastic changes in folic acid and vitamin B12 deficiency, and normocytic anemia in mixed cases. Hemoglobin levels below 11 g/dL in children under five were diagnostic of anemia. Serum ferritin, transferrin saturation, and total iron-binding capacity were key markers for iron deficiency. Vitamin B12 and folate levels were measured in suspected megaloblastic anemia. Peripheral smear findings provided further diagnostic support.

Management Outcomes

Iron supplementation (oral ferrous sulfate) for 3–6 months was effective in correcting anemia in most children. Dietary counseling, including increased intake of iron-rich foods (meat, fish, leafy greens) and vitamin C (to enhance absorption), was recommended. In cases of folate and vitamin B12 deficiency, specific supplementation was provided. Severe anemia with hemoglobin <7 g/dL required blood transfusion in selected cases. Preventive strategies included iron-fortified foods, regular deworming programs, and maternal supplementation during pregnancy.

Discussion

Nutritional anemia in children remains a major public health problem, particularly in resource-limited regions. The dominance of iron deficiency reflects poor dietary intake and chronic parasitic infestations. Preventive interventions such as supplementation programs, nutritional education, and fortification of staple foods have proven effective in reducing prevalence. However, challenges remain in ensuring compliance, addressing recurrent infections, and improving maternal health.

The association between childhood anemia and impaired cognitive development underscores the need for early diagnosis and treatment. Advances in screening methods, including point-of-care hemoglobin testing, have facilitated earlier detection in community settings. Future strategies should focus on integrated programs combining nutrition, infection control, and maternal-child health services.

Conclusion

Nutritional anemia in children is a widespread condition with profound health consequences, including impaired growth, neurodevelopmental delay, and increased susceptibility to infections. Early diagnosis, proper dietary interventions, supplementation, and public health strategies such as food fortification and deworming are critical in reducing disease burden. Strengthening pediatric health services and community-based prevention programs is essential to improve child health outcomes worldwide.

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