

Determinants of Nutritional Anaemia in Adolescents

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Abstract

Objectives: To associate the severity of nutritional anaemia with serum levels of ferritin, vitamin B12 and folate; and to determine demographic, socio-economic and nutritional correlates for nutritional anemia in adolescents. *Methods:* Cross-sectional hospital-based study among 200 adolescents (10-18 y) with anemia. Dietary intake (24-h recall), and serum levels of folate, vitamin B12 and ferritin were estimated. *Results:* Iron, folate and vitamin B12 deficiency was present in 30.5% 79.5% and 50% of adolescents, respectively. Statistically significant association was observed between severity of anemia and serum vitamin B12 levels, iron intake, folate intake, Vitamin B12 intake, vegetarian diet, attainment of menarche and history of worm infestation. *Conclusion:* Folate and vitamin B12 deficiencies are more common than iron deficiency in anemic adolescents. Low dietary intake of these nutrients seems to be a significant determinant of their deficiencies.

Keywords: Ferritin; Folic Acid; Iron-Deficiency; Vitamin B12 Deficiency.

Introduction

Adolescence is a vulnerable period in the human life cycle for the development of nutritional anemia. Anemia has a negative effect on cognitive performance in adolescents [1]. Choudhary, et al [2]. reported two-thirds of the anemic adolescents in community were suffering from iron deficiency anemia (IDA). In a study by Patra, et al. [3] on severely anemic adolescents admitted in a tertiary care hospital, megaloblastic anemia was most common type of anemia (42.5%) and iron-deficiency accounted for 15% cases. Compared to the vast amount of work done in pregnant mothers and young children, there are relatively few published studies in India evaluating deficiencies of Iron, Vitamin B12 and Folate in adolescents having nutritional anemia and its association with severity of anemia. This study was planned with an objective of finding association of the levels of micronutrients with the severity of nutritional anemia in adolescents.

Adolescence has been defined by the World Health Organization as the period of life spanning the ages between 10 to 19 years [4]. This is the formative period of life when the maximum amount of physical, psychological and behavioral changes takes place and this is a vulnerable period in the human life cycle for the development of nutritional anaemia, which has been constantly neglected by public health programs [3]. The prevalence is high in developing countries like India & is mainly ascribed to poverty, inadequate diet, pregnancy & lactation, late diagnosis and poor access to health services in developing countries [5].

Nutritional anaemia constitutes the most important cause of anaemia in adolescents. It is mainly due to deficiency of Iron, Vitamin B12 and Folate. Young people are particularly susceptible to develop anaemia because of their rapid growth and associated high iron requirements. Also adolescent's eating behavior is guided by many factors such as personal self-esteem & body image, making them skip meals to

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reduce weight and peer pressure indulging them in unhealthy food habits making them prone to nutritional anaemia .

Aim & Objectives

1. To study the types of nutritional anemia in adolescents (10-18 yrs.) attending the hospital and correlate severity of nutritional anemia with serum levels of ferritin, Vit B12 & folate.
2. To determine demographic, socio-economic & nutritional factors for anemia in adolescents.

Materials and Methods

The study was a cross-sectional observational study. Adolescents coming to outpatient department or admitted in the hospital satisfying the inclusion criteria were included in the study.

Adolescents (age 10-18 years) attending the outpatient department or admitted in the hospital, and having hemoglobin values below the cut-offs (Hb <12g/dL in 10-18 y girls and 10-14 y boys and Hb<13g/dL in 15-18 y boys) were included in the study after written informed consent from parent/guardian. Those who had received blood transfusion or hematinics in past 4 weeks or having apparent infection (fever, diarrhea, cough or burning micturition) or any chronic disease were excluded from the study. A detailed history and physical

examination of the study population was carried out. The premorbid dietary intake of the child was assessed by 24-hour recall method. This data was entered in 'Diet soft' software from which the daily intake of iron, folate and vitamin B12 was calculated. Complete blood count with peripheral smear examination was done. Serum Ferritin was estimated.

The severity of anemia was graded as mild (>10 g/dL but below age related cut-off for defining anemia), moderate (7-9.9 g/dL) and severe (<7g/dL). Serum vitamin B12 level of <200 pg/mL, folate level <5 ng/mL and ferritin level < 30ng/mL were considered as deficient.

Inclusion Criteria

Age group: 10-18yr age.

Haemoglobin levels below the following cut-off values:

Girls aged 10-18yrs Hb <12gm/dl.

Boys aged 10-14yrs Hb <12gm/dl.

Boys aged 15-18yrs Hb <13gm/dl.

Exclusion Criteria

Those who received blood transfusion in past 4 weeks. Those with known haematological or any other systemic disorder (thalassemia etc.) and/or evidence of apparent chronic infection (Tuberculosis, malaria etc.)

Table 1:

Severity of anaemia	Males	Females	Total
Mild (11-11.9 gm/dl)	56 (56%)	44(44%)	100 (100%)
Moderate (8-10.9 gm/dl)	47 (47%)	53 (53%)	100 (100%)
Severe (<8 gm/dl)	35 (35%)	65 (65%)	21 (100%)

Discussion

Our study showed that deficiency of folate, vitamin B12 and iron are common in anemic adolescents. Higher proportion of severely anemic individuals (20.5%) in our study can be attributed to hospital-based nature of the study. Prevalence of iron deficiency, vitamin-B12 deficiency and folate deficiency in our study is comparable to earlier reports from India [3-6]. Under the National programs (Iron plus initiative and weekly iron folate supplementation), the beneficiary receives supplemental iron and folic acid. Deficiency of B12 is currently not being addressed through these programs [7,8]. Vegetarianism was significantly

associated with severe anemia which was similar to the findings by Verma, et al. [9]. Attainment of menarche was also significantly associated with of anemia which was in agreement with the findings of Heath, et al. [10] who reported that high menstrual blood loss was associated with increased risk of anemia. A significant association between history of worm infestation and severity of anemia in the present study was in agreement to findings of Shield, et al. [11] who demonstrated a statistically significant inverse correlation between hookworm egg count and hemoglobin level.

Our study findings are limited by the hospital-based design of the study. Another limitation is that presence of infections which were not picked up on

detailed history and examination could have erroneously elevated the serum ferritin above the cut-off used for defining iron deficiency anemia.

Conclusion

Folate deficiency was the most common followed by Vitamin B12 deficiency & then iron deficiency. Low intake of all the three nutrients is a significant determinant towards causing nutritional anaemia. Supplementation with not only iron and folic acid but also Vitamin B12 is required through national programmes. History of worm infestation is a significant risk factor which should be taken care of.

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