

INTRODUCTION

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Iron deficiency continues to be a major public health problem in many developing countries, including India (WHO, 1976). It is undoubtedly one of the most serious health problems related to nutrition during adolescence (Greenwood and Richardson, 1979).

Iron deficiency anemia refers to a hematological state resulting from iron deficiency; its occurrence implies that body iron stores are severely depleted (Pollitt and Leibel, 1976). Thus, an individual may be iron deficient without manifesting iron deficiency anemia; the converse however, does not occur.

Children constitute about 40 percent of India's population. There is evidence (Gupta and Saxena, 1977; Rajalakshmi and Ramakrishnan, 1977; Gopaldas et al, 1983) to show that the prevalence of nutritional anemia in the underprivileged school age population is no less than 80% using the World Health Organization (WHO) cut off point of 12 g/dl thus making anemia a public health problem in this demographic group.

The prevalence of iron deficiency in relation to the adolescent growth spurt has received little attention (INACG, 1981). Towards the end of primary school years, a child is in the pre adolescent or adolescent stage and has to prepare for rapid growth and sexual development in the adolescent years ahead, which impose an extra demand for nutrients. During this period the red cell mass increases and there is a corresponding demand for iron. Additionally, the iron

losses in girls due to menstruation must be compensated for. Studies in Baroda have indicated near universal (90%) prevalence of anemia by the WHO norm in 5-13 year old girls (Gopaldas et al, 1983; Kanani, 1984).

Although, various levels of ferrous iron in hematological studies on response to iron therapy have been used in school children, no guidelines on the prophylactic dose level of iron are available.

Gopaldas et al (1983) demonstrated that a dose of 20 mg elemental Fe as FeSO_4 for 60 days twice in a school year was insufficient to elicit a significant betterment in the hemoglobin status of 10-13 year old underprivileged school girls indicating that a higher level of prophylactic Fe supplementation was required.

WHO (1975) suggested a dose of 3 mg elemental Fe as ferrous ascorbate /kg body weight/day for infants and pre-schoolers; however, the period of therapy was not indicated. INACG (1979) suggests that, "although elevated response in Hb is virtually completed by two months of therapy, iron therapy should be maintained for longer period to allow for accumulation of storage iron."

Thus, in the present study an attempt was made to study the impact of a prophylactic dose of 60 mg elemental Fe as FeSO_4 for 60 days, in each school term over one year.

Supplementation can be deemed useful if certain functional benefits can be demonstrated. Recent findings regarding the effects of iron deficiency on brain chemistry and work capacity indicate that iron deficiency has much wider implications beyond anemia.

Most of the studies conducted on the behavioral changes associated with anemia have either been on animals, infants or pre-schoolers. There is a great paucity of data on school children, especially girls. Moreover, no study to our knowledge has been conducted on the changes in Cognitive Function test scores on iron supplementation in school girls.

Various other reports appear to indicate that physical work capacity is significantly decreased in anemia. A reduction in Hb concentration reduces the oxygen carrying capacity of the blood which may reduce the oxygen delivered to the tissues during exercise. Such an impairment has also been observed in mildly anemic cases. The relationship between Hb concentration and productivity in adults has been fairly well documented but much needs to be done to establish such a relationship in school children.

The effects of iron deficiency and iron supplementation on growth have been studied but, not conclusively substantiated in human subjects. This relationship is better established in animal studies.

Although, anorexia has been considered to be a manifestation of anemia, the evidence in its support is scanty.

As mentioned earlier, the increased requirements for iron due to rapid growth and the onset of menarche in school girls (preadolescent and adolescent) leading to anemia could pose a greater strain. These children often have tiring household duties at home involving physical strength and increased energy expenditure. Girls in the low socio-economic group are usually married soon after puberty, which causes further depletion of body iron due to repeated pregnancies. Women who have no or low iron stores cannot go through pregnancy without becoming even more anemic.

Over the past three decades the enrolment of girls, 6-11 years, in schools has increased by over five times compared to the three-fold increase in case of boys. This is partly due to some priority having been given in recent years to girls education (UNICEF, 1984).

Thus, in order to improve the iron status of these future mothers and also to improve their intellectual and physical

performance, it is essential to meet their present iron requirements and build up adequate iron stores for future needs. Furthermore, girls are much more available in schools than ever before, thus intervention strategies could be conceived through the school health program to reduce the incidence of anemia in this population.

Therefore, this study was undertaken with the following general objectives :

- (i) To study the impact of prophylactic iron supplementation with 60 mg elemental Fe for 60 days at a stretch, twice in a school year on the iron status of underprivileged school girls (8 - 15 years of age).
- (ii) To study the impact of this regimen of prophylactic Fe supplementation on :
 - (a) Selected areas of Cognitive Function, namely, concentration, memory, discrimination, perception and visual motor coordination in underprivileged school girls (8-15 years of age).
 - (b) Selected parameters of Physical Work Capacity, namely, pulse rate and blood lactic acid in underprivileged school girls (8-15 yrs. of age).
 - (c) Growth status, namely, weight-for-age and height-for-age.