

A Study on Disease Management of Iron Deficiency Anemia in Adolescent Girls

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ABSTRACT

Anemia is present in a population when haemoglobin (Hb) concentration is less than 12g/dl between 12-14 years. The severity of anemia is classified on the basis on WHO i.e. Hb < 7gm%: Severe anemia, Hb 7-10 gm%: Moderate anemia, Hb 10-12 gm%: Mild anemia and Hb >12 gm%: Non- anemic. It is a serious public health problem in India affecting all segments of the populations. The vulnerable groups are infants, young childrens, adolescent girls, women of child bearing age and pregnant women. According to World Bank report (India's undernourished children: A call for reform and action) India is a country with highest prevalence of death due to anemia in the pregnant women (87%). Iron deficient anemia is one of the common disorders of iron metabolism due to oxidative stress and it is reported that vitamin E deficiency is one of the major causes behind iron deficient anemia by many researchers. Recent studies reveals that in iron deficiency anemia, life span of RBCs is reduced that increases the potential for oxidative stress. Vitamin E has been identified as an essential erythropoietic factor for certain species of animals. So keeping this point at mind this study is designed for disease management. Total 520 girls were selected for this study with their written consent. 5 ml of blood were taken as a study sample from adolescent girls for estimation of iron profile tests before and after supplementation. Group I was consisting with 320 iron deficient girls taken iron folic acid (100 mg iron + 0.5 mg folic acid daily) + Vitamin E (400 mg once a time daily) for three month. + antihelminthic drug Albendazole 400 mg once a single dose for six month where as Group II consist of 220 girls taken only same amount of iron and folic acid for six month. This work was approved by institutional ethical committee. From the study it was reveals that the group received vitamin E with their regular iron tablets having great increase in their Hb levels (7%). It was concluded from the research that supplementation of antioxidant vitamins are able to enhance iron metabolism and iron absorption which leads a significant improvement in hemoglobin level of anemic girls with one year.

Keywords: Iron deficient anemia, Antioxidant vitamin, Hemoglobin, Iron absorption, Oxidative stress.

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INTRODUCTION

Anemia is present in a population when haemoglobin (Hb) concentration is less than 12g/dl for children between 12-14 years (WHO, 2001). The severity of anemia is classified on the basis on WHO i.e. Hb < 7gm%: Severe anemia, Hb 7-10 gm%: Moderate anemia, Hb 10-12 gm%: Mild anemia and Hb >12 gm%: Non- anemic, World Health Organization, 2013. In anemia oxygen carrying capacity of blood is decreased which is a serious public health problem in India affecting all segments of the populations. According to *World Bank Report 'India's undernourished children' A call for reform and action*, 2008 the vulnerable groups are infants, young children, adolescent girls, women of child bearing age and pregnant women. Iron requirements of children are closely related to growth and increase during periods of rapid growth, both in pre-school and school age children. In girls, there is a further increase in iron requirements at the onset of menstruation reported by National Nutrition Monitoring Bureau-report (2006). Adolescent girls are at a high risk for anemia and malnutrition. Inadequate nutrition during adolescence can have serious consequences throughout the reproductive years of life and beyond. Very often, in India, girls get married and pregnant even before the growth period is over, thus doubling the risk for anemia (Chatterjee, 2008). A high prevalence of anemia among adolescent girls was found, which higher low economic strata were. It was seen that anemia affects overall nutritional status of adolescent girls. The problems of adolescence are multi dimensional in nature and require holistic approach. Some of the problems faced by adolescents are anorexia nervosa, obesity, overweight, micronutrient deficiency, emotional problems, behavioral problems, substance abuse, sexually transmitted diseases, and identity and study problems (Siddha ram et al., 2011). According to WHO estimates, India is one of the countries in the world that has highest prevalence of anemia. WHO estimates that 27 percent of adolescents in developing countries

are anemic; the (International center for research on women) ICRW studies documented high rates in India (55%), Nepal (44%), Cameroon (32 %) and Guatemala (48%). Rodrigo et al. (2007) reported that during iron deficiency may be termed as nutritional anemia because insufficient level of vitamin B12, A C E folate and riboflavin have been associated with it.

Justification: In the light of management of iron deficient anemia iron tablets are known to be the one and only rout to cure anemia but biochemically if iron absorption is lacking in body then taking the iron will not work and researchers proven that antioxidant play a major role for the enhancement of iron absorption, so keeping this point at mind this study is designed for disease management.

Research Objective: To improve morbidity of anemia in adolescent girls by establishing early diagnosis and treatment with the supplementation of antioxidant vitamins E.

MATERIALS AND METHODS

Total 520 girls were selected for this study with their written consent. 5 ml of blood were taken as a study sample from adolescent girls for estimation of iron profile tests before and after supplementation. Group II was consisting with 320 iron deficient girls were taken iron folic acid (100 mg iron + 0.5 mg folic acid daily twice a day) + Vitamin E (400 mg once a day) for six month. Whereas Group I as control group consist of 220 girls taken only same amount of iron and folic acid for six month. This work was approved by institutional ethical committee. Total hemoglobin, Mean Corpuscular Volume (MCV) and Mean Corpuscular Hemoglobin (MCH) is estimated by Hematology auto analyzer AcT 5 Diff AL analyzer which works on Absorbance Cytochemistry & Volume technology and WBC/BASO methodologies; whereas Iron, Ferritine, total iron binding capacity is measured by autoanalyser works on the principle developed by Klein et al. (1969). Vitamin E was estimated by method developed by Jargar et al. (2012).

RESULT AND DISCUSSION

It is reveals from the study that the iron profile tests shows the significant difference between Group I and Group II levels at significance level $p=0.05$. There is a progressive increase in ferritine, hemoglobin, MCH and MCV where as significant decrease pattern were observed in TIBC and transferrin parameters. From the study it is observed that group I received vitamin E with their regular iron tablets having 7% increase in their Hemoglobin level when compared with the hemoglobin before the supplementation. The significant increase of iron status is observed in the group taking supplementation of vitamin E and it is reported

that Vitamin E has been identified as an essential erythropoietic factor for certain species of animals (Chou et al., 1978; Fitch et al., 1980). Previous studies have shown that treatment with vitamin E increased the number of colony forming units of erythroid precursors (CFU-E), enhanced erythropoiesis and hemoglobin levels and, thus corrected the experimentally-induced anemia in laboratory animals (Gogu et al., 1991; Bartholomew et al., 1998; Cherdyntseva et al., 2005). It is reveals with the correlation analysis that there is a strong positive correlation between iron absorption and vitamin E.

Table 1: Showing Iron profile pattern in adolescent girls before and after the supplementation with antioxidant vitamin E

Biochemical parameters	Before the supplementation		After supplementation		Percentage(%) difference among Group II before and after supplementation with vitamin E
	Group I (Control)	Group II	Group I (Control)	Group II	
Serum Iron($\mu\text{g}/\text{dl}$)	95	48	98	51	6.25
Ferritin($\mu\text{g}/\text{l}$)	140	35	143	54	54.29
Total iron binding capacity($\mu\text{g}/\text{dl}$)	405	512	401	456	-10.93
Hemoglobin(gm/dl)	11.6	8.5	11.8	9.1	7.05
MCV(fL)	88	77	90	83	7.79
MCH(pg/cell)	29	20	30	27	35
Vitamin E ($\mu\text{g}/\text{ml}$)	13	3.4	15	5.6	64.7
Significance level	$P > 0.05$		$P > 0.05$		
Correlation coefficient of Iron with Vitamin E (Rho Value)	+1				Strong Positive Correlation between serum Vitamin E and Iron

Research Outcome: It was concluded from the research that supplementation of antioxidant vitamins are able to enhance iron metabolism and iron absorption which leads a significant improvement in hemoglobin level of anemic girls with one year.

Future scope: in the future this study may be leads to develop a management routs for disease management of iron deficient anemia in rural population in India.

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