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# ANTI OXIDANT VITAMINS IN IRON

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## ABSTRACT

Present study was designed to investigate the relationship of iron deficiency anemia with anti oxidant vitamins (Retinol, β-carotene, ascorbic acid and α-tocopherol). Forty-three anemic subjects (19 males and 24 females) and twenty-five control subjects were included in the study. The blood was analyzed for hemoglobin, red blood cell's indices, serum iron and total iron binding capacity. The results of these parameters were statistically significant ($p<0.001$) as compared to control subjects, but the levels of vitamins of anemic subjects were found to be statistically insignificant as compared to control subjects.

## INTRODUCTION

Anemia is defined as reduction in red cell mass. It is described as decrease in number of red blood cells per cubic mm or as decrease in hemoglobin concentration that is necessary for adequate tissue oxygenation (Keitt, 1985). Iron deficiency described as an insufficient supply of iron to the cells of body after reserves have been exhausted (Viteri, 1998). Anemia is classified according to patho-physiological basis i.e. whether related to diminished production or accelerated loss of red blood cells or according to cell size (Wallerstein, 1987).

Vitamin A deficiency and anemia may coexist and there is significant association between serum retinol and biochemical indicators of iron status (Mohanram *et al.*, 1978, Mejia Arroyave, 1982). It has been speculated that supplemental vitamin A during iron depletion contributes optimum erythropoiesis and iron mobilization when baseline vitamin A status is impaired (Roodenburg *et al.*, 1996).

Vitamin C is another important vitamin that enhances absorption of iron (Janet et al., 1990, Lynch and Cook, 1980). It also influences the storage and transport of iron in the body (Bothwell *et al.*, 1979). Ascorbic acid improved hemoglobin, erythrocytes, protoporphyrins and serumiron but not hematocrit, serum ferritin and total iron binding capacity (Janet *et al.*, 1990). Ascorbic acid is a good enhancer of non-heme iron and its supplementation increases dietaryiron absorption in iron depleted women (Hunt *et al.*, 1990).

Vitamin E act as an efficient antioxidant and it can be reduced by ascorbic acid and glutathione (Lester, 1991). Now vitamin E is used to treat iron deficiency anemia and has therapeutic advantage (Shpogina *et al.*, 1996).

## MATERIALS AND METHODS

Forty-three blood samples (19 males and 24 females) from pre-diagnosed anemic subjects (age 20-65y) were collected. The blood samples of 25 healthy control subjects (13 males and 12 females) having the ge 20-65 y with no symptoms of anemia were also collected and were analyzed for blood hemoglobin by cynmethemoglobin method (Dacie, 1984).Ascorbic acid by 2, 4, dinitrophenylhydrazine method (Roe and Kuether, 1943 cited by Gownlock, 1988). Serum retinol and carotenes by triflouracetic acid method (Bradley and Hornbeck, 1973 cited by Gowenlock, 1988). Serum α-

Table 1
Blood hemoglobin, red blood cell's count, iron, total iron binding capcity, ascorbic acid, retinol β-carotene and α-tocopherol in anemic subjects were estimated and compared with that of control. The mean values and S.E.M. are shown in table, the no. of cases are given in parenthesis

| Parameters | Hemoglobin gm/dl | RBCs Count x 10 exp 6 cells/cmm | Iron μg/dl | Total Iron Binding capacity μg/dl |
|---|---|---|---|---|
| Control | 12.34 ± 0.15 (25) | 4.22 ± 0.05 (25) | 70.28 ± 0.80 (25) | 269.86 ± 1.94 (25) |
| | | | | |
| | Ascorbic acid μg/dl | Retinol mg/l | B-Carotene mg/l | A – Tocopherol mg/l |
| | 1.35 ± 0.09 (25) | 0.67 ± 0.08 (25) | 0.89 ± 0.07 (25) | 7.88 ± 0.59 (25) |
| | | | | |
| | Hemoglobin gm/dl | RBCs Count x 10 exp 6 cells/cmm | Iron μg/dl | Total Iron Binding capacity μg/dl |
| Anemic | 9.43 ± 0.22 (43) | 3.22 ± 0.07 (43) | 56.70 ± 0.80 (43) | 286.80 ± 2.30 (43) |
| | | | | |
| | Ascorbic acid μg/dl | Retinol mg/l | B-Carotene mg/l | A – Tocopherol mg/l |
| | 1.35 ± 0.08 (43) | 0.58 ± 0.05 (43) | 0.88 ± 0.10 (43) | 7.70 ± 0.63 (43) |

tocopherol by Baker and Frank method (Baker and Frank 1968, cited by Gowenlock, 1988). Serum iron by Ferene-S method with the help of kit (cat.no.KC-127), clontial). Serum total iron binding capacity by magnesium carbonate method using kit (Cat. No.KC-127, clonital).

## RESULTS

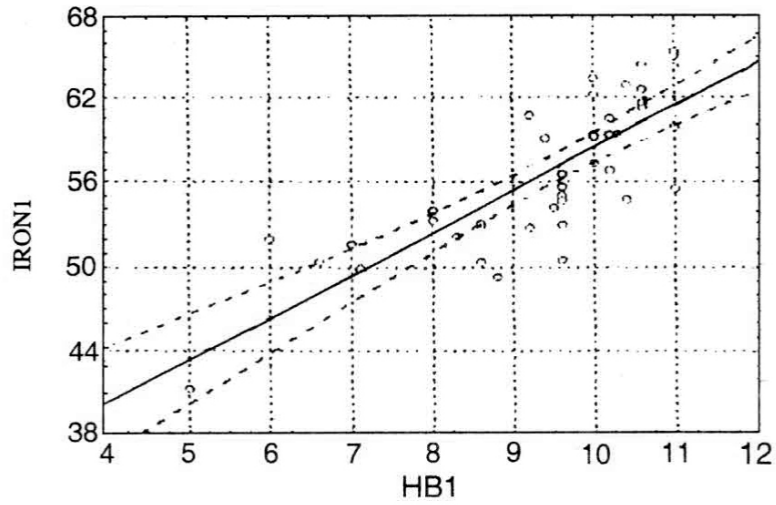
Parameters of anemic and control subject were investigated and given in the Table 1. It was observed in this study that all vitamin levels of anemic subjects were statistically insignificant as compared to control subjects. But other parameter values of anemic subjects such as hemoglobin, serum iron and red blood cell's count were found to be significantly decreased ($p<0.001$) as compared to control subjects. Total iron binding capacity values of anemic subjects were found to be significantly increased ($p<0.001$) as compared to control subjects.

## DISCUSSION

Poor socio-economic status and lack of dietary iron contribute to develop anemia. The anemia in females is more common than males, it means females are mostly prone to anemia than males (Galan and Yoon 1998).

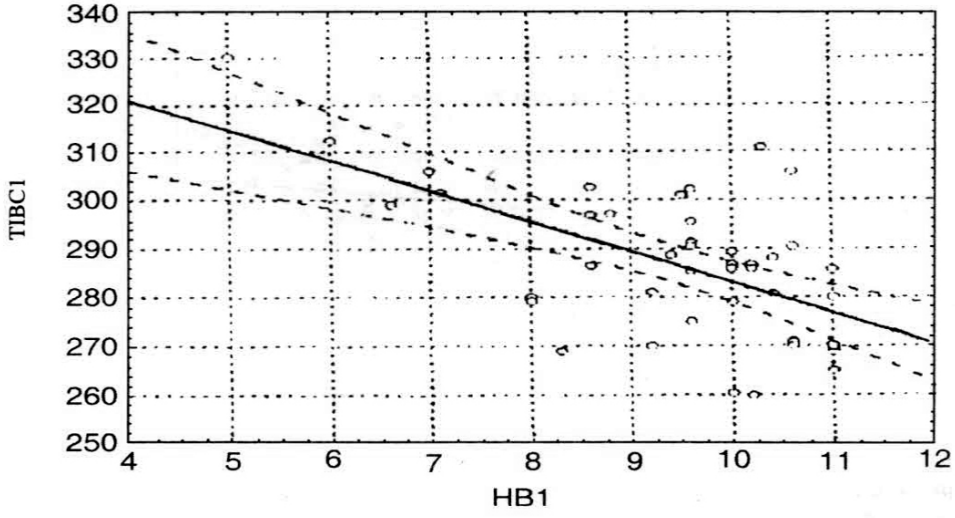
In the present study significantly decreased ($p<0.001$) values of hemoglobin, red blood cell's count, serum iron and statistically increased ($p<0.001$) values of total iron

Fig. 1: Coefficient correlation between iron and hemoglobin of anemic subjects



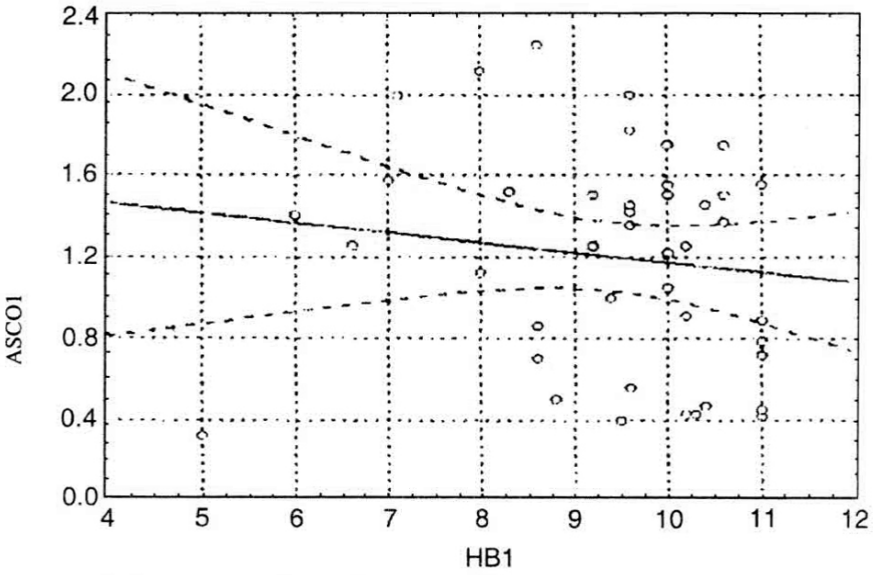

HBI vs. iron 1 (Casewise MD deletion) - Iron 1 = 28.409 + 3.0023* HB1 - Correlation r = 80904
Iron 1 = Serum Iron level of anemic subjects - HB1 = hemoglobin of anemic subjects

Fig. 2: Coefficient correlation between total iron binding capacity and hemoglobin of anemic subjects



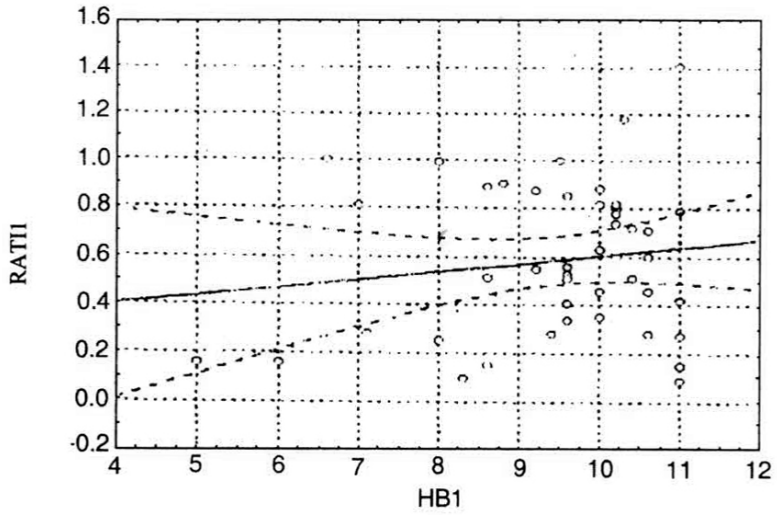

HBI vs. Iron 1 (Casewise MD deletion) - TIBC1 = 346.13 – 6.296 * HB1 - Correlation r = -.5949
TIBC1 = Total iron binding capacity of anemic subjects - HB1 = hemoglobin of anemic subjects

Fig. 3: Coefficient correlation between ascorbic acid and hemoglobin of anemic subjects




HB1 vs. ASCO1 (Casewise MD deletion) - ASCO1 = 1.6514 - .0480* HB1 - Correlation: r = -.1290
ASCO1 = Ascorbic acid of anemic subjects - HB1 = Hemoglobin of anemic subjects

Fig. 4: Coefficient correlation between retinol and hemoglobin of anemic subjects




HB1 vs. RATI1 (Casewise MD deletion) – RATI1 = .26517 + .03394* HB1 - Correlation: r = -.15263
RATI1 = Retinol of Anemic Subjects - HB1 = Hemoglobin of Anemic subjects

binding capacity was found in anemic subjects as compared to control subjects. More than 85% of anemia is due to iron deficiency according to Viteri, 1998. Eighty percent iron of the body is used for erythropoietic production (Sjaastad *et al.*, 1996). Obviously when iron level is low in the body, if affects all processes of body that depend on this iron. In present study values of vitamin A, C and E of anemic subjects were found to be statistically insignificant as compared to control subjects. In Pakistan Anjum and Rana 1998 had suggested that vitamin A status of Pakistani anemic women is adequate and does not appear to be a predisposing factor in the etiology of iron deficiency anemia. Djoko et al., 1992 had found similar results. 2.5% iron deficient anemic women. Bloem *et al.*, 1989 found an association between serum retinol and transferring saturation but no association between serum retinol and hemoglobin, although vitamin A mayincrease iron status (Mohanram *et al.*, 1978, Mejia *et al.*, 1997).

In present study vitamin C values of anemic subjects were found to be statistically insignificant as compared to control subjects. Vitamin C is involved in the synthesis of red blood cells (Behrman *et al.,* 1987), it improves hemoglobin and serum iron (Janet *et al.,* 1990). Vitamin C also influences storage and transport of iron in body (Bothwell *et al.*, 1979), it means that deficiency of vitamin C may alter the iron level and hemoglobin level. The ability to mobilize the iron is dependent on normalizing ascorbic acid status (Wapnick *et al.,* 1970, Chapman *et al.,* 1982, Charlton & Bothwell, 1976. Bothwell *et al.,* 1964, Roeser *et al.,* 1980).

Vitamin E values of anemic subjects are statistically insignificant in the present study. Meydani *et al.* (1998) had suggested that supplementation of vitamin E for four months had no effect on body weight, plasma total proteins, total blood cells, white blood cells, platelets number, bleeding time, hemoglobin and hematocrit.

In the present study vitamins levels of anemic subjects were adequate, although iron deficiency is most prevalent single nutritional deficiency affecting over 2000 million people in the world (Viteri, 1998). There was strong relationship between blood iron with hemoglobin (Figure 1-4). Anemia is a condition not a disease, so it is necessary to control specific disease to overcome anemia.

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