



Comparative Efficacy of Weekly Once Iron with and Without Vitamin C Supplementation in Anaemic Adolescent Girls in Improving Hemoglobin Levels - Randomized Controlled Trial

KEYWORDS

iron, vitamin C, hemoglobin, adolescent girls

Dr.Stalin.S

M.D(Paed), Principal investigator, Institute of Child Health & Hospital for Children, Egmore

Dr.Annamalai vijayaraghavan

Professor of pediatrics, Institute of child health and Hospital for children, Egmore, Chennai -600008

ABSTRACT BACKGROUND: Studies regarding weekly oral iron with added vitamin C in improving the hemoglobin in adolescent south Indian girls are plausible.

Objective: To compare the efficacy of supplementation of weekly iron tablets with and without vitamin c in improving hemoglobin percentage in anaemic adolescent girls.

Design: Randomized controlled study

Setting: Adolescent girls studying in government corporation schools.

Intervention : Group A was given weekly oral IFA and group B weekly IFA with vitamin c. Hemoglobin, weight and height were recorded at enrollment of study and at 12 and 24 weeks.

Results: Statistical significant increase in Hb% was noted in group B ($p=0.000$). Mean gain in Hb% in group B at 12 & 24 weeks were 1.47 ± 0.57 , 2.30 ± 0.69 .

Conclusion: Increment in Hb levels was more effective with addition of vitamin C to weekly IFA supplementation.

INTRODUCTION

Nutritional deficiency disorders constitute a major health problem in India. Micronutrients are vital for developing normal learning and cognitive functions, immune defence mechanisms, work capacity and reproductive health¹. In India, prevalence of anaemia among adolescent girls is high since they are vulnerable and requirement of iron and losses from the body are high. Anaemia during adolescence results in increased maternal mortality and decreased child survival, as supplementation during pregnancy fails to restore iron stores. Our objective is to compare the efficacy of weekly iron tablets with and without vitamin C in improving Hb levels in anaemic adolescent girls.

METHODS

Randomised controlled study. Adolescent girls in the age group 10- 14 yrs studying 6th-9th were selected from four government schools. Study period was August 2010 - April 2011. All anemic adolescent girls were included in the study. Children with hemolytic anaemia, bleeding disorder, leukemia, any chronic illness, known anaemic child who was already on treatment and Hb < 7 g/dl were excluded.

In our study, 346 adolescent girls in the age group 10-14 yrs were enrolled and 322 were subjected to study. Number of girls with Hemoglobin value ranging from 7-12g/dl were 220 and they were randomized into group A and B, 110 in each group. After obtaining informed parental consent, 20 microlitre blood was obtained by finger prick and Hb estimated by cyanmethemoglobin method by adding 5ml drabkins solution and read by spectrophotometer.

At enrollment, data were collected regarding anaemic status, height and weight. BMI were calculated using NCHS standards. Qualitative data was obtained through self administered questionnaire regarding symptoms of anaemia from parents and awareness of anaemia questionnaire from students.

All the adolescent girls were initially dewormed with tablet albendazole and then started on oral IFA supplementation. 110 children in group A received weekly oral iron (100 mg of elemental iron & 0.5mg folic acid) for 24 weeks. 110 children in group B received weekly oral iron(100 mg of elemental iron & 0.5mg folic acid) with vitamin C 100mg for 24 weeks. Any side effects as reported by the children or their parents were documented and confirmed.

At 12 and 24 weeks, Hb, height and weight were recorded. 5 children in each group lost to follow up. Statistical analysis was done using paired 't' test. Quantitative variables expressed as mean & SD.

RESULTS

At enrollment, 49.40% were mild anaemic, 18.90% were moderate anaemic and 1.20% were severe anaemic. The age distribution in both the groups were comparable. Majority of the children were in the age group 12 & 13 yrs

The mean height in group A was 142.8 ± 8.3 cm and Group B 144.2 ± 8.3 cm. Mean weight in group A was 33.4 ± 8.6 kg and in group B was 33.3 ± 7.8 kg. Undernutrition was seen in 24.5% (group A) & 22.7% (group B).

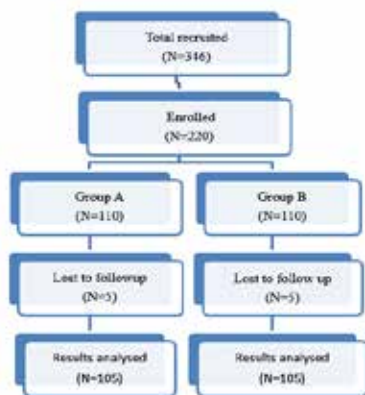


Figure 1: Study flow chart

According to WHO criteria for severity of anaemia, moderate anaemia was seen in 37.5% in group A & 39.4% in group B. About 5 children in each group lost to follow up.

TABLE 1: Hemoglobin distribution at enrollment

HEMOGLOBIN(g/dl)	GROUP A	GROUP B
7.1-8	10(9.1%)	10(9.1%)
8.1-9	11(10%)	10(9.1%)
9.1-10	9(8.2%)	11(10%)
10.1-11	64(58.2%)	70(63.6%)
11.1-12	16(14.5%)	9(8.2%)

On enrollment, Mean Hb in group A was 10.2 ± 1.14 g/dl and in group B was 10.2 ± 1.08 g/dl.

Table 2 :Gain in hemoglobin at 12 & 24 weeks

WEEKS	GROUP A		GROUP B		T TEST
	MEAN	SD	MEAN	SD	
0-12	0.92	0.35	1.47	0.57	0.000
12-24	0.63	0.35	0.82	0.39	0.000
0-24	1.56	0.47	2.30	0.69	0.000

Mean Hb at 12 weeks in group A was 11.8 ± 1.07 g/dl and in group B was 11.72 ± 0.89 g/dl. Mean Hb at 24 wks in group A was 11.8 ± 0.93 g/dl and group B 12.54 ± 0.71 g/dl.

In group A, severity of anaemia decreased from 37.5% to 17.1% at 12 wks and to 8.6% at 24 weeks in moderate anaemia. Mild anaemia decreased from 64.5% to 54.3% at 12 wks and 26.7% at 24 wks.

In group B, severity of anaemia decreased from 39.4% to 6.7% at 12 wks and to 3.8% at 24 wks in moderate anaemia. Mild anaemia decreased from 60.6% to 32.4% at 12 wks and 11.4% at 24 wks.

Prevalence of anaemia was decreased by 37% in group A and by 15.2% in group B. There is no statistically significant difference in weight, height gain, BMI gain between two groups.

DISCUSSION

Iron deficiency anemia is the significant problem in school going adolescent girls and our study showed 68.3% were anemic which was comparable to previous studies^{13, 14, 17}. Saturation of iron binding protein, apoferritin in the mucosal cells is the rate limiting step in absorption of iron (mucosal block theory)⁸. As intestinal mucosal removal time is 5-6 days, strategy of weekly iron supplementation was strongly suggested^{11, 13} and the same were followed in our study to improve the compliance¹⁶. Addition of vi-

tamin C to weekly iron supplementation showed better increment of hemoglobin in a shorter period than iron alone.^{5, 11}

In our study, weekly once IFA supplementation showed comparable results with a mean Hb% increase from 10.29 ± 1.14 to 11.8 ± 0.93 g/dl at the end of 24 weeks^{13, 15} compared to study done by Mehta et al where significant increase in hemoglobin was 10.45 ± 1.21 g/dl to 11.99 ± 1.19 g/dl which was comparable. In our study 100mg Vitamin C was added to the weekly regimen and showed comparable results.^{6, 11, 12}

Our study revealed that mean Hemoglobin was increased in both groups, but statistical significant increase in mean Hb was noted in weekly once IFA + Vit C supplementation group. There is no difference in weight & height gain and BMI in both the groups. Awareness about anaemia was poor. Qualitative data analysis showed better response in both groups and this may be subjective and may be influenced by various other factors.

In our study, weekly iron supplementation with added Vitamin C showed baseline increase in hemoglobin concentration of 2.30 ± 0.69 g/dl compared to a hemoglobin increase of 1.56 ± 0.47 g/dl in weekly once iron folate supplementation group at the end of 24 weeks period ($p=0.000$). The prevalence and severity is also significantly reduced in the added Vitamin C group.

From the Indian Institute of Health and Family Welfare, Annual Report, 2002-2003¹⁷ it was evident that the results of midterm survey revealed that weekly IFA supplementation to school going girls, under teacher's supervision, for preceding six months together with IEC intervention resulted in a significant increase in haemoglobin levels, indicating the feasibility of this approach. In our study, IFA with added Vitamin C weekly under supervision is feasible and statistically significant increase in hemoglobin was noted.

CONCLUSION

IFA with added Vitamin C weekly under supervision is feasible and statistical significant increase in hemoglobin was noted. Compliance is better and side effects were minimal.

A public health approach consisting of once weekly distribution of iron/folate with added vitamin C through schools under supervision may be a better strategy than giving weekly iron/folate supplementation alone.

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