

Effect of Once a Week Iron Supplementation among Adolescent Girls in Visakhapatnam District –An Intervention Study

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Abstract: *INTRODUCTION:* Iron deficiency anemia is one of the most prevalent micro nutrient deficiencies in the world and also in India. In India the problem is very much high among adolescent girls (80%) . In this context, the present study was taken up among adolescent girls residing in the social welfare hostels in Visakhapatnam district, Andhra Pradesh, India.*AIM&OBJECTIVE:*To estimate the rise of hemoglobin levels in adolescent girls residing at welfare hostelswiththe supplementation of weekly Iron Folic acid (IFA) tabletsfor 12 weeks period. *MATERIALS& METHODS:* A Non Randomized Uncontrolled interventional trail was executed among 120 adolescent girls residing at three randomly selected welfare hostels in Visakhapatnam district. Iron & Folic Acid tablets were supplied weekly once to the girls with the prior permission from care takers from jan213 to April 2013 period. Anthropometric measurements were taken. Haemoglobinlevelswere estimated usingCyanmethmoglobin Diagnostic kit. Relevant statistical tests were applied to test the significance. *RESULTS:* The mean age of study subjects was13.01yrs± 1.32 yrs. After 12 weeks of intervention with IFA tablets,meanhaemoglobin levels raised significantly from 9.7± 1.8 gm/dl to12.6± 0.8 gm/dl and the overall prevalence of anaemia reduced significantly from 96.4% to 20%. Only 5.4% members complained side effects. *CONCLUSIONS:* Weekly supplementation of 'IFA' to adolescent girls is reducing the prevalence of anemiaamong them with added benefits of less adverse reactions.

Keywords- ADOLESCENT GIRLS,ANEMIA, WIFS

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I. Introduction

Adolescence is a crucial period of development after childhood. World Health Organization (WHO) has defined adolescence as the age group of 10-19 years¹. During this phase of life, significant physical, physiological, psychological and emotional changes occur; which have bearing on the individual, community and the nation (2). More than 20% of the total stature in growth and up to 50% of the adult bone mass is achieved in adolescence (3). Because of this accelerated growth, the requirement for iron in fact doubles during adolescence as compared to younger age group. A girl of this age group needs additional 15% iron as menstruation begins (4). This accelerated increase in requirements for iron, poor dietary intake of iron, high rate of infections and worm infestation as well as the social norm of early marriages and adolescent pregnancies are raising the risk of iron deficiency anaemia during adolescence period. Anaemia is a condition that results in a lowering of haemoglobin levels below what is considered to be normal for specific demographic groups. In India anaemia is recognized as one of the public health problem as 90% of adolescent girls are anaemic (5). Previously daily administration of 60mg of elemental iron was used to be prescribed as a treatment of iron deficiency anaemia in adolescents. But the daily administration of iron results in a rapid decline in percent of iron absorption. It loads the intestinal epithelium with iron and also causes gastrointestinal symptoms. As the renewal time of the intestinal mucosa is five to six days, a similar weekly dose of iron should be efficacious, gives adequate time and compliance, and also side effects would be minimized as already proved by some studies. (6). The scheduled castes and scheduled tribes have been identified as two most disadvantaged groups of Indian society needing special attention. The data regarding the morbidity status in social welfare hostels for the scheduled castes are sparse, despite the usefulness of such information in the management of hostels and upliftment of these groups (7). Various base- line studies also revealed that the health, nutritional and educational status of adolescent girls belong to these groups are at sub-optimal level (8). So the present study was taken up as a with an aim to estimate the rise of hemoglobin levels in adolescent girls residing at welfare hostels in the Visakhapatnam district with the supplementation of weekly IFA tablets for 12 weeks period.

II. Objectives

1. To assess the nutritional status of study population by anthropometric measurements before and after intervention with IFA tablets.
2. To compare the hemoglobin status among adolescent girls before and after intervention with IFA tablets for 12 weeks period.

III. Methodology

The present study was a Non Randomized Uncontrolled interventional trail conducted among the adolescent girls residing at welfare hostels in Visakhapatnam city from November 2011 to October 2013 period. Sample size was calculated using the formula Calculated by using formula $n = 4pq/l^2$ p= Prevalence of anemia among adolescent girls in India ^[1]– 80, q=100-p =100-80 = 20, l= 10% of prevalence = 10/100×80=8, $n=4 \times 80 \times 20 / 8 \times 8 = 100$, 20% Attrition =100+20=120. Simple random sampling technique was used to select the sample from study population. List of social welfare hostels in Visakhapatnam district was obtained from the Directorate of social welfare. There are 8 social welfare girl's hostels in Visakhapatnam city premises. Among them three hostels were chosen out of 8 social welfare hostels through simple random sampling method. Inclusion Criteria was Girls belong to age group 10-19yr , Girls willing to participate in the study. Exclusion Criteria History of malaria in last 1year Girls not willing to take IFA tablets. Girls those who fit into inclusion criteria were included in the study from Sabbavaram, Maharanipecta and Bheemunipatnam social welfare hostels in Visakhapatnam till the desired sample of 120 was met.

Prior ethical committee clearance was obtained from Institutional Ethical Committee, Andhra Medical College. Permission had taken from concerned authorities such as Visakhapatnam District Collector, Deputy Directors of Social Welfare and BC Welfare for conducting study. Informed consent was obtained from the wardens of welfare hostels. To ensure safety, the drugs were procured from the District Medical & Health Officer's Office, Visakhapatnam. The selected hostels were visited and the girls were interviewed. Age was recorded and was determined from the register of the hostel. Nutritional status of the subjects was assessed through height, weight and Body Mass Index (BMI). Base line hemoglobin levels were estimated using Cyanmethemoglobin method (gold standard method) with help of Lab technician. After that, supplementation with IFA tablets was done for 12 weeks period from 22 January 2013 to 13 April 2013. One dose of Albendazole tablet (400mg) was given to the girls two days prior to the first dose of IFA tablet for deworming. This was done to rule out the effect of intestinal infestations on absorption capacity of the supplemented iron. Study subjects were educated regarding importance of IFA tablets, nutrition, personal hygiene and menstrual hygiene. Girls were provided with IFA tablets supplementation on every tuesday in Sabbavaram hostel, on every wednesday in Maharanipecta hostel and on every saturday in Bheemunipatnam hostel under direct supervision. This supplementation was continued for 12 weeks period without any interruption. Nutritional status of study subjects and Haemoglobin levels were measured at the end of 12 weeks period two days after last dose. The data was analyzed using Statistical package for social sciences (SPSS) trial version 16 and relevant statistical tests were applied to test the significance of results.

IV. Results

Out of 120 study subjects 110 adolescent girls took Iron folic acid tablets regularly during the study period with an attrition of 8.3%. Information from these 110 adolescent girls were considered for analysis of the study results.

Back ground information of study subjects: In the present study mean age in our study population was 13.01 ± 1.32 years. Two fifths 44(40%) of adolescent girls were studying 9th class, 30(30%) were from 8th class, remaining were from 5th, 6th and 7th classes. Nearly half of parents of study population were illiterates (46.36% - fathers and 56.36% -mothers). In the present study majority 68(62.7%) of study subjects belong to scheduled caste and scheduled tribe categories, 35 (31.8%) of subjects belong to backward classes and 7(5.5%) of subjects belong to other castes category. About 68(60%) of adolescent girls were staying in the hostel since ≥2years. In the present study 61.8% girls were attained menarche. The mean age of menarche was 12 years.

Table No.1: Variation of anthropometric measurements before and after intervention

Anthropometric measures	Before intervention	After intervention	Change	P value
Height (in Cms)	144±8.2	145±7.6	1.5±1.2	<0.001
Weight (in Kgs)	35.4±7.3	36.2±7.1	0.9±0.8	<0.001
BMI	16.8±2.3	16.9±2.3	0.42±0.3	>0.05
Hb (gm/dl)	9.7±1.2	12.6±0.8	2.9±1.1	<0.001

Table no.1 shows the distribution of means of height, weight, BMI and hemoglobin levels before and after intervention among the study subjects. Mean height of adolescent girls after intervention with an improvement of 1.5cm±1.2cm during the 12 weeks intervention period was observed in this study. Mean weight of study subjects showed a rise of 0.9Kg±0.8kg in the intervention period. A significant height gain of 1.5cm±1.2cms and weight gain of 0.9kg±0.8kg was seen after intervention (Paired-t test p<0.001). there was no significant improvement in BMI after intervention. A raise of Hemoglobin level by 2.9gms/dl±1.1gms/dl was reported in the present study and the difference had statistical significance (Paired t-test p<0.001).

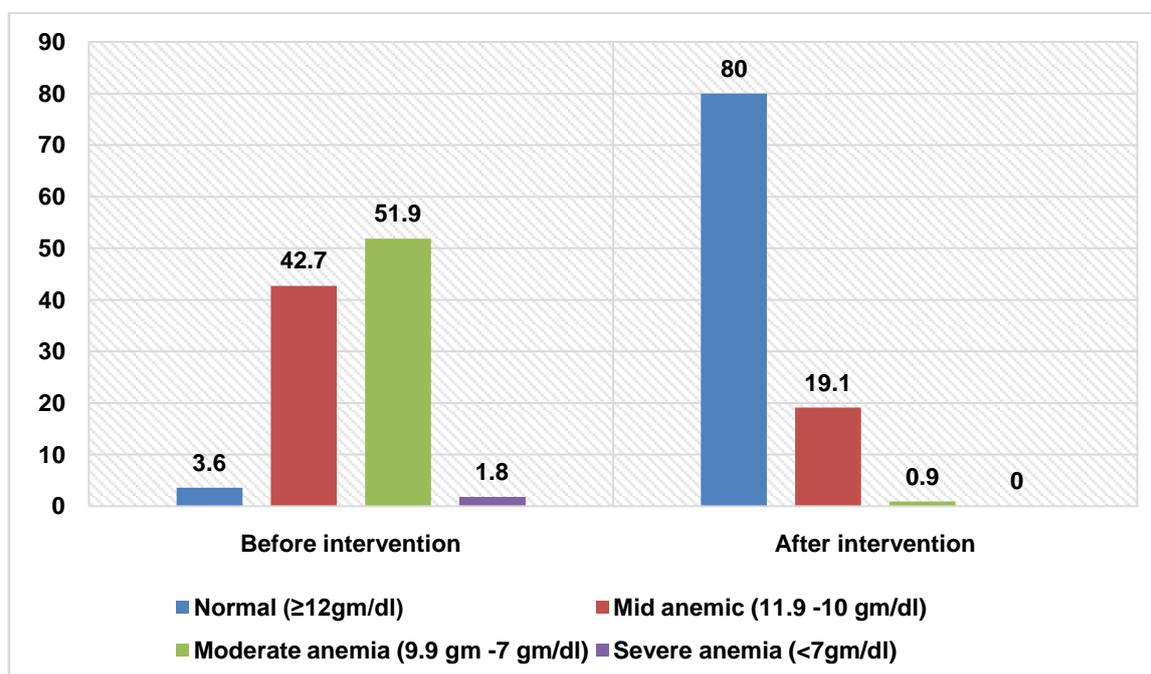


Figure no: 1 Prevalence of anaemia in study population before and after intervention with IFA tablets

Figure no.1 shows the prevalence of anaemia among study subjects before and after intervention. Before intervention mild and moderate anemia was more prevalent in adolescent girls. But after intervention the prevalence of mid anaemia observed mainly in study population along with <1% of moderate anemia. None of them had severe anemia after intervention. All three forms of anaemia came down from 96.4% to 20% with the intervention with IFA tablets. Intervention led to decrease of mild anaemia from 42.7% to 19.1%, moderate anemia from 51.9% to 0.9% and severe anemia from 1.8% to 0%. This decrease of prevalence of anaemia had statistical significance with two tailed p value <0.0001 on Fisher Exact Test.

Table no.2. Distribution of study population according to symptoms

Symptoms	Before intervention n=110 (%)	After intervention n=110 (%)
Tiredness	42 (38.1)	10(9)
Shortness of breath	40 (36.3)	5(4.5)
Soreness of mouth with cracks at the corner	35 (31.8)	5(4.5)
Difficulty to concentrate	15 (13.6)	6(5.4)
Lack of interest in play and studies	15 (13.6)	3(2.7)
Rapid heart beat	15 (13.6)	0 (0)
Leg cramps	10(9)	2(1.8)
Dizziness	10 (9)	0 (0)
Head ache	10 (9)	0 (0)
Passage of worms in the stools	2 (1.8)	0 (0)

Table no.2 shows the distribution of complaints regarding their health in the study population. In the present study 78.2 % of adolescent girls were complained of anyone symptom of anaemia. Before intervention with IFA tablets, tiredness is the major complaint among the girls 42(38.1%) followed by shortness of breath 40(36.3%) and soreness of mouth with cracks at the corner among 35(31.8%) of girls. But after intervention these symptoms appearance reduced to 10(9%), 5(4.5%) and 5(4.5%) respectively. Before intervention 15(13.6%) girls complained difficult to concentrate, lack of interest in plays & studies and rapid heartbeat, 10(9%) of study population complained leg cramps, dizziness and head ache and 2(1.8%) of girls complained of passage of worms in the stools. Whereas after intervention of IFA tablets 6(5.4%) girls complained about

difficulty in concentration, 3(2.7%) girls complained about lack of interest in plays & studies and 2(1.8%) girls complained about leg cramps. No one was found in the study population with symptoms such as dizziness, rapid heartbeat, head ache and passage of worms in the stools after intervention with IFA tablets. Out of 110 girls only 6 girls (5.4%) were complained side effects. The side effects reported included constipation, sleepiness, abdominal pain, rash, and nausea. Usually the side effects became milder after a couple of days and eventually disappeared.

V. Discussion

This study demonstrated that weekly iron supplements of 60mg elemental iron and 0.5 mg folic acid for 12 weeks improved nutritional status significantly in terms of height & weight among adolescent girls but not in terms of BMI.

A study conducted by Shubhada j kanani et al.(9) among 9 to 16yrs old school girls in Vadodara primary school also showed similar results such as improvement of 0.83kgs mean weigh in the study period. Whereas a study conducted by Beasley, N. M. et al.(10) among Tanzanian adolescent girls reported a significantly greater weight gain (2.4 kg ± 1.4 kg) with weekly iron supplementation after 4 months of intervention. V. M. Aguayo et al.(11) in their study in Bolivian children reported a significant weight and height gain (mean weight 1.88kg ± 0.79kg, mean height 2.35cm ± 0.94cm) with supplementation of IFA tablets. Rassamee Sungthong et al.(12) found that average height gain was greater in children who received weekly supplementation of iron for 16 weeks 2.6cm ± 0.9cm. There was no significant improvement in BMI after intervention which was similar to study conducted by Aditisen et al.,(13) after weekly supplementation of IFA tablets in a dose of 100 mg Fe + 0.5mg folic acid for one year and Hassan Mozaffari-Khosrav et al.,(14) also reported the same result i.e., no significant difference between the baseline measures and after 16 weeks of intervention regarding BMI.

In the present study a significant rise in mean hemoglobin levels were observed with intervention with IFA. A similar result also observed in the study conducted by Indian Institute of Health and Family Welfare (2001-2002) examined the efficacy of once-weekly IFA supplementation among rural school going adolescent girls in Andhra Pradesh and reported beneficial effects on Hemoglobin levels in the once-weekly supplementation group(15).

In the present study overall prevalence of anemia decreased from 96.4% to 20% which is statistically significant. This finding is also observed in the study conducted by Renuka Jayatissa et al., in Colombo, Srilanka(16). The prevalence of anaemia reduced from 25% to 9.5% with weekly supplementation of Iron for 8 weeks. A study conducted by Hassan Mozaffari-Khosrav et al (14) in Yazd city in central Iran, reported the same, i.e., percentage of anemia reduced from 12.5% at baseline to 2.1% with IFA supplementation for 16 wks. Angeles-Agdeppa et al., (17) reported that prevalence of anemia reduced from 20% to 5.7% after 12wks of supplementation of Iron.

In the present study only 5.4% study participants complained side effects. Renuka Jayasitta et al., (16) in Colombo district reported less number of side effects after intervention as 1.6% among daily supplementation group and 0.7% among weekly supplementation group. This observed value is less than the prevalence of side effects in the present study.

Limitations of the study: Serum ferritin estimation could not be done which is a good indicator of iron deficiency.

VI. Conclusion

The mean BMI of adolescent girls in social welfare hostels was <18.5 indicating the prevalence of underweight which is an alarming sign. Weekly supplementation of Iron Folic Acid tablets to adolescent girls is rising the mean Hemoglobin levels within a short span of 12 weeks intervention period and also reducing the prevalence of anemia among them with added benefits of less adverse reactions. But the only required thing is regular supply of medication and drug compliance without any interruption.

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