

ISSN 0970-0218



Apr-Jun 2016 / Vol 41 / Issue 2

Indian Journal *of* Community Medicine

Official Publication of Indian Association of Preventive and Social Medicine

www.ijcm.org.in



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Effectiveness and Feasibility of Weekly Iron and Folic Acid Supplementation to Adolescent Girls and Boys through Peer Educators at Community Level in the Tribal Area of Gujarat

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ABSTRACT

Background: Anemia during adolescence affects growth and development of girls and boys increasing their vulnerability to dropping out-of-school. Hence investing in preventing anemia during adolescence is critical for their survival, growth and development. **Objective:** To find out the burden of anemia on adolescent age group in the tribal area of Jhagadia block and to assess the change in the hemoglobin level through the weekly Iron and Folic Acid IFA (DOTS) directly observed treatment supplementation under Supervision by Peer Educators at Community level among adolescents. **Methods:** Community based intervention study conducted with adolescents (117 girls and 127 boys) aged 10-19 years, through supplementation of IFA (DOTS) by trained Peer Educators for 52 weeks in 5 tribal villages of Jhagadia. Hemoglobin level was determined by HemoCue method before and after intervention and sickle cell anemia by Electrophoresis method. Primary data on hemoglobin and number of tablets consumed was collected and statistically analyzed in SPSS 16.0 software by applying paired *t*-test. **Results:** The overall findings suggest that the prevalence of anemia reduced from 79.5% to 58% among adolescent girls and from 64% to 39% among boys. Mean rise of hemoglobin seen was 1.5 g/dl among adolescent boys and 1.3 g/dl among girls. A significant association was found in change in hemoglobin before and after intervention ($P = 0.000$) **Conclusion:** Prevalence of anemia among girls and boys can be reduced in their adolescent phase of life, through weekly supplementation of iron folic acid tablets under direct supervision and Nutrition Education by Peer Educator at community level.

Keywords: Adolescents, anemia, hemoglobin, IFA (DOTS), prevalence, sickling

Introduction

Adolescence (10-19 years) is a “coming of age”, as children grow into young adults. Anemia among adolescents is commonly seen. Iron deficiency anemia in adolescents can negatively impact on growth, increase susceptibility to infection, and also impair mental

development and learning.⁽¹⁾ During this time 20% of final adult height and 50% of adult weight are attained. The prevalence of anemia in girls (Hb < 12 gm%) and in boys (Hb < 13 gm%) is high as per the reports of

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How to cite this article: Shah SP, Shah P, Desai S, Modi D, Desai G, Arora H. Effectiveness and feasibility of weekly iron and folic acid supplementation to adolescent girls and boys through peer educators at community level in the tribal area of Gujarat. Indian J Community Med 2016;41:158-61.

Access this article online

Quick Response Code:



Website:

www.ijcm.org.in

DOI:

10.4103/0970-0218.173498

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Received: 19-09-14, **Accepted:** 25-05-2015

NFHS-3 and the National Nutrition Monitoring Bureau Survey.^(2,3) An estimated 56% girls and 30% boys in the age group 10-19 years in India are anemic according to NFHS-3 data.⁽⁴⁾ In India, the highest prevalence of anemia is reported between the ages 12-13 years, which also coincides with the average age of menarche.⁽⁵⁾ To combat anemia in adolescents, Government of India has decided to implement the Weekly Iron and Folic Acid (IFA) Supplementation (WIFS) Programme under NRHM in 2013 in class VI to XII enrolled in government/ municipal schools through the platform of schools and out of school through Anganwadi Centers across all states in India⁽⁶⁾ This method of weekly IFA supplementation through school teachers at school level proved effective as a strategy.⁽⁶⁾

But the coverage of this scheme is low hence we tried its delivery through peers. The present study on Anemia was conducted to find out the burden of anemia on adolescent age group in the tribal area of Jhagadia and to assess the change in the hemoglobin through the weekly Iron and Folic Acid (DOTS) supplementation by Peer Educators at Community level among adolescent boys and girls.

Materials and Methods

A community based cross-sectional study was conducted before and after introducing intervention in the months of April, May and June 2013 under Sharda Mahila Vikas Society (SMVS) in five tribal villages of Jhagadia block, Gujarat, India. SMVS is a voluntary organization has been working since 2002 towards the development of women, youth and children.

Universal sample size was considered for this study as all adolescent girls (117) and boys (127) of the age 10-19 years, registered under the Adolescent Awareness Programme were enrolled in this study.

Anthropometric measurements such as Height, Weight was done. Hemoglobin level was determined using HemoCue method (standardized by WHO) and sickling estimation done using DTT and electrophoresis.

Intervention

Awareness sessions were conducted for mothers and adolescents.

Administration of weekly Iron and Folic Acid IFA (DOTS) (100 mg elemental iron and 500 µg folic acid) tablets with the distribution of Albendazole tablets for de-worming bi-annually under the supervision of trained peer educators along with IEC materials. Adolescents with severe anemia were referred to nearby hospital in Jhagadia.

Peer educators were provided training and incentives for their work. Data on the Hemoglobin level was collected by trained Health Supervisors, while data on number of iron tablets consumed was collected ongoing by the Peer Educators and thereby all the data was entered in excel and statistically analyzed by applying paired t-test in SPSS 16.0.

Ethical consideration

Informed Verbal consent was taken from the adolescent girls and boys and their mother before Hemoglobin collection.

Results

Adolescents were 100% tribal, 76% living in kutcha house and below poverty line, Only 5% households had toilets, 67% were school going and 23% were dropouts. Peer Educators were chosen among the Adolescent girls and boys of the same community. 80% peer educators were pursuing their secondary education. They are the leaders at the local community level. There are around 7 females and 8 males.

Hemoglobin estimation

Baseline hemoglobin estimation was performed on adolescent 141 girls and 143 boys but statistical analysis was done on adolescents who were available, girls 117 and boys 127 for both the pre and post test. Mean rise of hemoglobin seen among adolescent boys was 1.5 gm/dl and for adolescent girls was 1.3 gm/dl in the tribal area of south Gujarat. 14.4% adolescents were diagnosed with sickle cell trait with no disease.

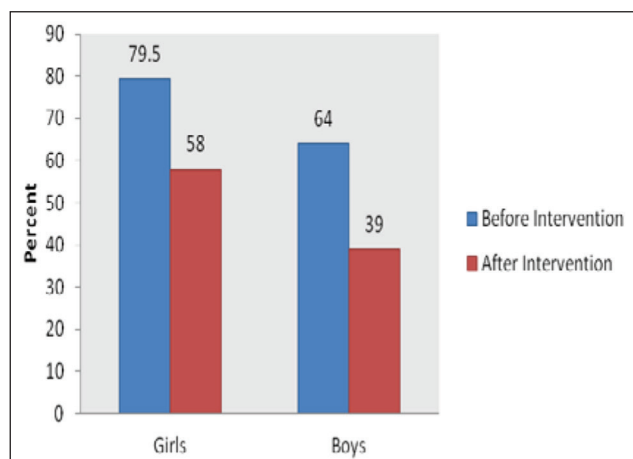
There was significant reduction in anemia of all severity among adolescent girls and boys at the end of intervention compared to before. The result of this study shows that 79.5% girls and 64% boys were anemic during baseline survey [Figure 1]. It reduced to 21.5% after intervention making the prevalence to be 58% among girls. The prevalence of anemia among adolescent boys was 64% before intervention and it reduced to 25% after intervention making the prevalence to be 39%. [Table 1] 2 gm increase was seen among 24.8% girls and 19.7% boys. Girls were more compliant than boys [Figure 2]. It was also seen that the adolescent girls who did not consume iron tablets are 0.73 times more likely to develop anemia than those who consumed iron tablets and adolescent boys who did not consume iron tablets are 0.60 times more likely to develop anemia than those who consumed iron tablets Thus the relationship between consuming iron and folic acid tablet in preventing anemia was statistically significant ($P < 0.05$).

BMI estimation

The Body Mass Index estimation was done for adolescent girls and boys and it was found that before intervention

Table 1: Prevalence of anemia according to severity before and after intervention among adolescent girls (N = 117) and boys (N = 127)

Area	Anemia level (Hb in gm/dl) among adolescent girls								Z t-test
	Severe <7 (%)		Moderate 7-9.9 (%)		Mild 10-11.9 (%)		Normal ≥12 (%)		
	Before	After	Before	After	Before	After	Before	After	
Girls	2 (1.7)	1 (0.9)	27 (23)	7 (5.9)	64 (54.7)	60 (51.3)	24 (20.5)	49 (41.9)	0.000
Boys	1 (0.8)	0 (0)	15 (11.8)	6 (4.7)	65 (51.2)	43 (33.9)	46 (36.2)	78 (61.4)	0.000

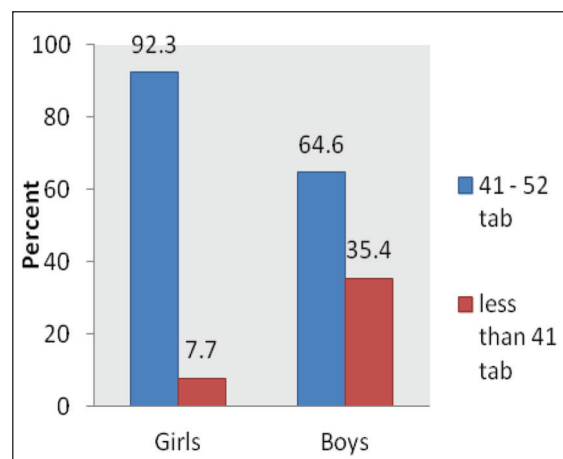
**Figure 1:** Reduction in anemia on consumption of iron and folic acid (DOTS) tablet among adolescents

88% adolescent girls and 92% boys were mal-nourished. After intervention the BMI increased to 19% among girls and 13 % among boys.

Discussion

In the present study, the prevalence of anemia among adolescent girls was found to be 79.5% before intervention. Studies conducted in Wardha, Hyderabad, India reported a similar prevalence of 59.8%, 60% and 63% respectively.⁽⁷⁻⁹⁾ Other studies conducted in various part of the country showed the prevalence of anemia of 44.8%, 34.5%, 25.9%, 23.9% in Tamil Nadu, Meerut, Varanasi and Chandigarh among adolescent girls respectively.^(6,10-12) WHO Global Data Base on anemia in Karnataka showed a prevalence of anemia among adolescent girls to be around 50.7%.⁽¹³⁾

Interestingly very few studies have been conducted on anemia among adolescent boys, where one of the studies in Nepal reported a prevalence of 47.7% among boys and 52.3% among girls.⁽¹⁴⁾ While study in Gujarat reported 75% anemia among girls and 16% reduction in the prevalence of anemia in the tribal area among school going adolescent girls where weekly iron and folic acid supplementation was done by school teachers⁽¹⁵⁾ while in our study the reduction was 21.5% among girls and 25% among boys in the tribal area. It may be due to better compliance of IFA (DOTS) tablets provided through Peer Educators.

**Figure 2:** Compliance with weekly IFA among adolescents by gender

World health report 2002, identified anemia as one among the top 10 risks for infant mortality, maternal mortality and preterm birth. WHO/UNICEF has suggested that the problem of anemia is of very high magnitude in a community when prevalence rate exceeds 40%.⁽¹⁶⁾ There were various reasons for decrease in hemoglobin level due to non-compliance of iron and folic acid tablets of its taste or due to migration of families, abortions or possibility of sickle cell anemia etc. A significant association was found in change in hemoglobin before and after intervention ($P = 0.000$) among adolescents.

This study shows that anemia among these rural tribal adolescents is high like other parts of the country. The hemoglobin level increased among adolescents suggesting that anemia can be corrected by weekly prophylaxis if right approach is made.

Conclusion

The study gives an insight that anemia is not only common among girls but also among boys. This study indicates that that weekly IFA under the supervision of trained peer educators may reduce the severity of anemia.

In-depth study should be conducted to know the serum ferritin and serum trans-ferritin level. Schemes like mid-day meal and supplementary food at Anganwadi center should be regularly monitored in terms of quality

and quantity of food and its supply. Iron fortification of food flour should be done.

Limitations

- No Randomization was done, universal sample was taken.
- There had been few dropouts during the post intervention test.

Acknowledgement

Authors thank Galaxy Surfactants for their financial assistance and adolescents participants for their readiness to contribute towards this study and Ms. Ranjan Atodariya, Gaytri Patel and Rajendra Patel for data collection.

Financial support and sponsorship

Nil.

Conflicts of interest

Shobha Shah, Pankaj Shah, Shrey Desai, Dhiren Modi, Gaytri Desai, Honey Arora declare that they have no conflict of interest.

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