

Compliance and Factors Affecting Weekly Iron and Folic Acid Supplementation Programme in Schools of Bhopal District

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Abstract:

Background: The awareness regarding anemia and appropriate diet is also extremely poor in school going children. There is a misconception that only girls need iron. During this phase the requirement for growing boys also jumps significantly. To reduce the prevalence and severity of nutritional anemia among adolescent population (10-19 years) Weekly Iron and Folic Acid Supplementation programme (WIFS) launched by GOI. This study was planned to assess Compliance and factors affecting Weekly Iron and Folic acid Supplementation Programme in schools of Bhopal district.

Materials and Methods: After institutional ethical committee approval, a longitudinal school based study done in randomly selected government schools of Bhopal (M.P.), India.

Results: Among 257, there were 128(49.8%) males and 129 (50.2%) females. At baseline prevalence of anemia was 32.8% among boys and 57.4% among girls. At follow up prevalence of anemia was 30.5% among boys and 55.8% among girls. Mean rise in hemoglobin at the end of three months is 0.229 ± 0.2407 mg/dl. It was found to be statistically significant. At follow up it was found that total 215(83.7%) adolescents were compliant and 42(16.3%) were not compliant. Change in mean hemoglobin at follow up visit is more in compliant group with mean and standard deviation 0.263 ± 0.2382 compared to non-compliant. Compliance to iron folic acid supplementation was better observed among Hindu religion. It was found statistically significant ($p < 0.05$). Majority of the participants i.e. 99.2% boys and 96.1% girls did not have any side effects with consumption of iron folic acid supplementation, however there were some complaint of nausea in 2.1% girls only and dizziness 0.8% in both and 0.4% stomach ache in girls only. Analysis of the probable factors that can be associated with the change in mean hemoglobin shows that compliance towards iron folic acid supplementation and deworming was significantly associated with it. Rest of the factors (Gender, Religion, Type of family, Type of diet, Menstrual loss) was not significantly associated.

Conclusion: Most of the school students consume IFA tablets under WIFS programme although irregularly and inadequately due to many reasons. However, a high degree of compliance can be achieved by emphasizing the positive benefits of weekly iron-folic acid supplementation though a comprehensive communication and motivation strategy.

Keywords: Anemia, WIFS, Compliance, School going.

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Introduction

Anemia is currently one of the most common and intractable nutritional problems globally [1]. With 40 per cent prevalence of anaemia in the world on an average for the general population, the prevalence in the developing countries tends to be three to four times higher than in the developed countries [2]. The awareness regarding anemia and appropriate diet is also extremely poor in school going children; which is made worse by the

lucrative promotional campaigns of various junk foods. There is a misconception that only girls need iron. During this phase the requirement for growing boys also jumps significantly [3]. Iron deficiency anemia in adolescents can negatively impact on growth, increase susceptibility to infection, and also impair mental development and learning. During this time 20% of final adult height and 50% of adult weight are attained [4]. India, the highest

prevalence of anaemia is reported between the ages 12-13 years, which also coincides with the average age of menarche [5].

In India, iron is poorly absorbed due to diet patterns and rarely consuming balanced diet, there is requirement of iron supplementation to prevent and control anemia. Anemia can be prevented among adolescents by consuming iron and folic acid tablets regularly once a week, ideally 52 tablets in 52 weeks of a year. On this basis to reduce the prevalence and severity of nutritional anemia among adolescent population (10-19 years) Weekly Iron and Folic Acid Supplementation programme (WIFS) launched by the Ministry of Health and Family Welfare- Government of India. This programme had been implemented whole India in both rural and urban areas [6].

Studies showing compliance and factors affecting to WIFS were done previously in other states but not identified in MP. So, this study was planned to assess Compliance and factors affecting Weekly Iron and Folic acid Supplementation Programme in schools of Bhopal district.

Methods

It is a longitudinal school based study.

Study Area: Selected 4 Government schools of Bhopal.

Study Population: Adolescents from schools selected.

Study Duration: May 2019 to Dec 2019.

Inclusion Criteria: Adolescents (10-19 years) whose parents given consent were selected

Exclusion Criteria: Adolescents suffering from any type of hemoglobinopathies like sickle cell anemia, thalassemia etc. or having chronic disease affecting hemoglobin level.

Sample Size: In Madhya Pradesh, prevalence of anemia is 53.2% among adolescent girls and 36.5% among adolescent boys [7]. Therefore, mean prevalence among adolescents is 44.85%.

On applying formula

$n = Z^2pq/l^2$ (Here allowable error is taken as 15%, so $p \times 15\%$ i.e. $44.85 \times 15/100 = 6.73$)

So, $n = 1.96 \times 1.96 \times 44.85 \times 55.15 \div 6.73 \times 6.73 = 209.8 \approx 210$

To maintain homogeneity among number of boys and girls and to cover loss to follow up (20%) we took 280 as sample size i.e. 280 adolescents of 10-19 years of age.

Sampling: The list of all schools was initially obtained from district education office. Later 4 schools were selected randomly by lottery method.

70 adolescents meeting the criteria were selected by random selection without replacement method from each school in which 35 boys and 35 girls were of age group 10-19 years and likewise required sample size of 280 adolescents were selected from 4 Government schools.

Consent: Verbal consent was obtained from the study participants and then written consent from their parents was obtained after explaining them the nature and purpose of the study. They were assured that privacy would be stringently maintained. The option to withdraw from the study was always open.

Methodology

Permission from District Education Officer of Bhopal (M.P.) was taken after obtaining clearance from the Institutional Ethical Committee. Desired schools were selected as per requirement from the list of schools obtained. After permission from respective school's Principals, we visited the respective schools and approached the eligible participants. Informed consent obtained from parents of participants and then they were interviewed using a Pre designed Pretested Semi structured questionnaire. The questionnaire included socio-demographic variables such as age, education and occupation of parents, monthly income, number of family member, religion, type of family, dietary practices etc. Using a digital hemoglobinometer hemoglobin level was also estimated. We were able to study 257 adolescents as rest denied to participate.

Statistical Analysis: Data was entered MS excel 2007, analysis was done with the help of Epi-Info 7 software. Frequency and percentage were calculated & statistical test (Chi Square) was applied wherever applicable; P value <0.05 was taken as statistically significant.

Results : Here 257 study participants were from ages 10-19 years. Among 257, there were 128(49.8%) males and 129 (50.2%) females. At baseline prevalence of anemia was 32.8% among boys and 57.4% among girls. At follow up prevalence of anemia was 30.5% among boys and 55.8% among girls (Fig -1). The distribution was found statistically significant ($p < 0.05$).

At baseline mean hemoglobin among 257 study participants was 11.895 ± 1.6564 mg/dl, with minimum and maximum hemoglobin level 7.3 mg/dl and 14.6 mg/dl. Thus range was 7.3 mg/dl. At follow up visit mean hemoglobin level among participants was 12.123 ± 1.5928 mg/dl, with minimum and maximum hemoglobin level 7.3 mg/dl and 14.5 mg/dl. Thus range was 7.2 mg/dl. Mean rise in hemoglobin at the end of three months is 0.229 ± 0.2407 mg/dl. Analysis show significant increase in

mean hemoglobin level after follow up visit (P-value <0.05) (Analyzed by paired t-test)

S. No.		Base line	Follow up
1	Mean hemoglobin (mg/dl)	11.895	12.123
2	Standard Deviation	1.6564	1.5948
3	Mean rise in hemoglobin (mg/dl)	0.229 ± .2407	
4	Minimum (mg/dl)	7.3	7.3
5	Maximum (mg/dl)	14.6	14.5
6	Range (mg/dl)	7.3	7.2
7	t-value	-15.078	
8	P-value	< 0.001	

At follow up it was found that majority boys 106(82.8%) were compliant to iron folic acid supplementation and 22(17.2%) were not, similarly majority 109(84.5%) girls were compliant and 20(15.5%) were not compliant. In total 215(83.7%) adolescents were compliant and 42(16.3%) were not compliant (Table -1). However it was found not statistically significant ($p > 0.05$).

Table 1: Distribution of participants according to gender and compliance to Iron Folic Acid Supplementation

S. No.	Compliance	Male n (%)	Female n (%)	Total n (%)
1	Yes	106(82.8)	109(84.5)	215(83.7)
2	No	22(17.2)	20(15.5)	42(16.3)
Total		128(100)	129(100)	257(100)
P-value		0.422		

Change in mean hemoglobin at follow up visit is more in compliant group with mean and standard deviation 0.263 ± 0.2382 compared to non compliant group where mean and standard deviation was 0.052 ± 0.1656 (Table -2).

It was found statistically significant ($p < 0.05$).

Table 2: Association of compliance to Iron Folic Acid Supplementation with mean change in hemoglobin

S. No.		Compliant	Non Compliant
1	n (%)	215(83.7)	42(16.3)
2	Change in mean hemoglobin (mg/dl)	0.263	0.052
3	Standard deviation	0.2382	0.1656
4	P-value	< 0.001	

Compliance was seen in majority 209(97.2%) Hindu participants and was least in 6(2.8%) Muslim participants. Similarly non compliance was seen in majority 35(83.3%) adolescents among Hindu participants and was least in 7(16.7%) Muslim participants (Table - 3). It was found statistically significant ($p < 0.05$).

Table 3: Distribution of compliance of adolescents to oral Iron Folic Acid Supplementation according to the their religion

S. No.	Religion	Compliant n (%)	Non-Compliant n (%)
1	Hindu	209(97.2)	35(83.3)
2	Muslim	6(2.8)	7(16.7)
Total		215(100)	42(100)
P-Value		0.002	

Compliance was seen more in 165(76.7%) participants belonging to nuclear family and was least in 50(23.3%) participants those belonging to joint family. Similarly non compliance was seen more in 30(71.4%) participants belonging to nuclear family and was least in 12(28.6%) participants those belonging to joint family (Table - 4). It was found statistically not significant ($p > 0.05$).

Table 4: Distribution of compliance of adolescents to oral Iron Folic Acid Supplementation according to the their type of family

S. No.	Type of family	Compliant n (%)	Non-Compliant n (%)
1	Nuclear	165(76.7)	30(71.4)
2	Joint	50(23.3)	12(28.6)
Total		215(100)	42(100)
P-Value		0.438	

Compliance was seen more in 120(55.8%) participants who took mixed diet as compared to those were on vegetarian diet 95(44.2%). However non compliance was seen more in 23(54.8%) participants who were on vegetarian diet as compared to those taken mixed diet 19(45.2%)(Table – 5). It was found statistically not significant ($p > 0.05$).

Table 5: Distribution of compliance of adolescents to oral Iron Folic Acid Supplementation according to the their type of the diet

S. No.	Type of the diet	Compliant n (%)	Non-Compliant n (%)
1	Vegetarian	95(44.2)	23(54.8)
2	Mixed(vegetarian + non-vegetarian)	120(55.8)	19(45.2)
Total		215(100)	42(100)
P-Value		0.138	

Majority of the participants i.e. 81.7% (81.2% male and 82.2% female) didn't mentioned any reasons in regular consumption of iron folic acid supplementation. Mostly cited dislike as the reason in 16% participants (18% male and 14% female), and least 0.4% stomach ache (0.8% in girls only) (Fig - 1). These were found not significant ($p > 0.05$).

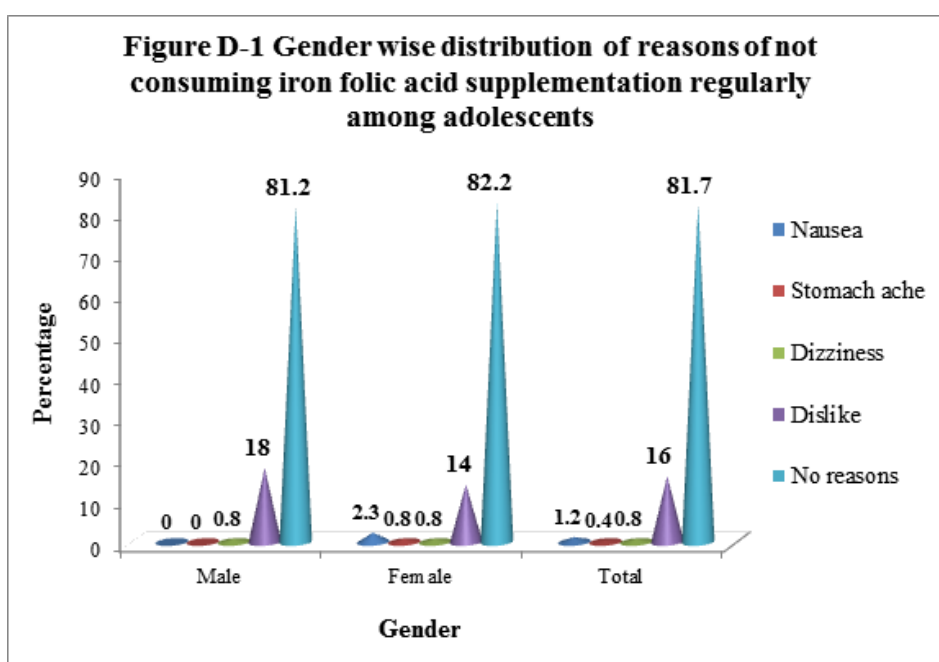


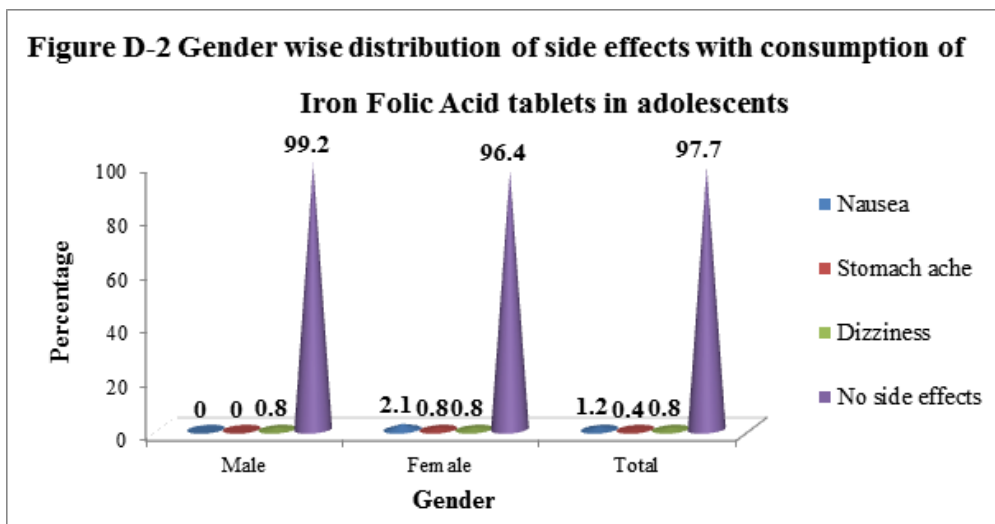
Table - 6 shows that those who told no reasons for consumption were 210(97.7%) and were compliant. However few 5(2.3%) were compliant despite some reasons.

Whereas 42(100%) adolescents had told some reasons for non consumption of Iron Folic Acid tablet and were therefore non compliant. This distribution was statistically significant ($p < 0.05$)

Table 6: Distribution of compliance of adolescents to oral Iron Folic Acid Supplementation according to the their reasons of non consumptions

S. No.	Reasons	Compliant n (%)	Non Compliant n (%)
1	Some reasons	5(2.3)	42(100)
2	No reasons	210(97.7)	0(0)
Total		215(100)	42(100)
P-Value		0.00013	

Majority of the participants i.e. 97.7% (99.2% boys and 96.1% girls) did not have any side effects with consumption of iron folic acid supplementation, however there were some like complaint of nausea in 1.2% (2.1% girls only) and dizziness 0.8% (0.8% in both) and 0.4% stomach ache (0.8% in girls only) (Fig D-2). These were found not significant ($p > 0.05$).



Analysis of the probable factors that can be associated with the change in mean hemoglobin shows that compliance towards iron folic acid supplementation and deworming was significantly associated with it. Rest of the factors (Gender, Religion, Type of family, Type of diet, Menstrual loss) was not significantly associated. (Table- 7)

Table 7: Association of change in mean hemoglobin with different factors

S. No.	Factors	n (%)	Mean ± SD	P-value
1	Gender			
	Male	128(49.8)	0.216 ± 0.2379	0.383
	Female	129(50.2)	0.242 ± 0.2436	
2	Religion			
	Hindu	244(94.9)	0.236 ± 0.2409	0.47
	Muslim	13(5.1)	0.100 ± 0.2041	
3	Type of family			
	Nuclear	195(75.9)	0.237 ± 0.2385	0.34
	Joint	62(24.1)	0.203 ± 0.2476	
4	Type of diet			
	Vegetarian	118(45.9)	0.197 ± 0.2532	0.05
	Mixed	139(54.1)	0.256 ± 0.2269	
5	Menstrual loss			
	Normal	82(88.2)	0.232 ± 0.2276	0.575
	Excessive	11(11.8)	0.273 ± 0.2195	
6	Compliance			
	Compliant	215(83.7)	0.263 ± 0.2382	0.0001
	Non compliant	42(16.3)	0.052 ± 0.1656	
7	Deworming			
	Yes	172(66.9)	0.198 ± 0.2458	0.004
	No	85(33.1)	0.291 ± 0.2186	

Discussion

In this study, at baseline mean hemoglobin among 257 study participants was 11.895 ± 1.6564 mg/dl and at follow up visit at the end of three months mean hemoglobin level was 12.123 ± 1.5928 mg/dl with mean rise in hemoglobin was 0.2 ± 0.24mg/dl. It was found to be significant statistically (p < 0.05). In a study conducted by Shobha P Shah et.al [8] (2013), mean rise of hemoglobin seen among adolescent boys was 1.5 gm/dl and for adolescent girls was 1.3 gm/dl. A significant association was

found in change in hemoglobin before and after intervention (P = 0.000) among adolescents, similar to our study. According to Rachana M Bhoite et.al [9] (2010) in a study found that among boys change in mean hemoglobin level was 1.8±0.4 mg/dl and among girls change in mean hemoglobin level was 1.5±0.1mg/dl.

In the present study, most of the boys 106(82.8%) and girls 109(84.5%) were compliant to iron folic acid supplementation compared to 22(17.2%) boys and 20(15.5%) girls who were not compliant. In

total 215(83.7%) were compliant and 42(16.3%) were not compliant ($p > 0.05$). According to a cross sectional study by Midhun Kumar GH et. al [10] (2017), most of the students 276(83.7%), 141 (79.2%) boys and 135 (88.2%) girls had taken all the four tablets in the last 4 weeks, like our study. On the other hand in a study by Sarada A K et.al [6] (2016) reported among 524 students only 119 (22.7%) consumed the weekly IFA tablets.

In the present study, majority of the participants i.e. 81.7% (81.2% male and 82.2% female) consuming IFA regularly and didn't mentioned any reasons or problems in regular consumption of iron folic acid supplementation. Most cited dislike as the reason in 16% participants (18% male and 14% female), and least 0.4% stomach ache (0.7% in girls) ($p > 0.05$). In a cross sectional study among the adolescents from 2 schools by Sarada A K et.al [6] (2016) reported reasons for not taking IFA regularly as Not necessary because I am healthy by 39.8%, Not good for health, Can cause serious problems by 19.2%, Resistance from parents by 21.2, Reports from media about side effects by 14.5%, No reasons mentioned by 5.1%. [11] According to a study by Sajna M. V. et. al [12] (Dec 2014 to May 2015), among the school students found reasons for not taking IFA regularly as No reasons by 64.7%, Fear of problems by 12.4%, Stomach ache by 7.9%, Parents not consented by 7.1%, Having another tablets by 2.5%, Vomiting by 2.1%, Information from News Paper by 1.7%, No faith in Tablets by 1.2%, Not a prescription by a Doctor by 0.4%.

Compliance to iron folic acid supplementation was better observed among Hindu religion. It is found statistically significant ($p < 0.05$), however gender, type of family, type of diet and Menstrual loss were not significantly associated consumption of IFA tablets ($p > 0.05$).

In a study by Hema Divakar et.al [13] (2017) reported that Gender, type of family, were not associated with consumption of IFA tablets.

Majority of the participants i.e. 97.7% (99.2% boys and 96.1% girls) did not have any side effects with consumption of iron folic acid supplementation, however there were some complaint of nausea in 1.2(2.1% girls only) and dizziness 0.8% (0.8% in both) and 0.4% stomach ache (0.8% in girls only). These were found insignificant ($p > 0.05$).

According to a study by Jyothi Lakshmi Naga Vemuri et.al [14] (Aug - Oct 2018), reported problems faced by children as nausea in 23%, stomach pain in 8% and vomiting in 4%. On the other hand in a study by Sarada A K et.al [11] (2016) reported 23.3% children faced side effects out of which 55% had stomach pain followed by vomiting 15%.

Conclusion

The period of school going children is period of rapid growth, when iron requirement for both girls and boys increases. Most of the school students consume IFA tablets under WIFS programme although irregularly and inadequately. Barriers of IFA tablet consumption such as side effects, lack of awareness among students, and irregular supply of tablets should be considered. Iron fortification of foods and/or changing composition of iron preparation to avoid side effects may also be considered in future. However, a high degree of compliance can be achieved by emphasizing the positive benefits of weekly iron-folic acid supplementation though a comprehensive communication and motivation strategy.

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