

Evaluation of Weekly Iron and Folic Acid Supplementation program for adolescents in rural Pondicherry, India

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Abstract

Background: Weekly Iron and Folic Acid Supplementation (WIFS) program is a newly initiated program in Pondicherry. It was considered crucial to explore the compliance and “for and against” forces for it so as to facilitate its future implementation in a community setting.

Objectives: To evaluate the recently initiated WIFS program for government school children.

Materials and Methods: It was a mixed-methods study design, where quantitative (survey of students) and qualitative (key informant interviews of teacher in charge of WIFS, health assistants, and auxiliary nurse midwife) methods were used.

Results: Out of the 345 participants of quantitative survey, there were 110 boys and 235 girls. Majority (85.8%) of the students reported to consume four tablets of Iron folic acid (IFA) in the past 4 weeks. The major reasons for non-compliance reported were absenteeism (55.1%), powdery tablet (22.4%), and side effects (22.5%). Most motivating role in taking IFA tablet regularly was played by the teacher. The percentage of students who correctly reported at least three iron-rich food was 40%. Significantly girls had better knowledge about symptoms of anemia and iron-rich diet than boys. Major positive factors for the program reported by the students and key informants were benefits such as an improved sense of well-being, motivation by parents, teachers, and friends, health education by the local medical officer and health staff, regular supply of tablets, and demand from private schools for IFA tablets. Major negative factors for the program reported were fear of adverse effects such as nausea, attribution of abdominal pain due to other causes of IFA tablets, and extra workload on teachers.

Conclusion: We found a good compliance to IFA tablet consumption. In order to improve the program further, awareness about side effects on IFA tablet consumption and health education about iron-rich diet should be strengthened.

KEY WORDS: Adolescent, anemia, evaluation, Weekly Iron and Folic Acid Supplementation

Introduction

Adolescent anemia is a long standing public health problem in India.^[1] An estimated 56% adolescent girls and 30% adolescent boys in India are anemic, according to the third

National Family Health Survey.^[2] Efficiency of weekly iron supplementation in the control of nutritional anemia has been demonstrated in various research settings of India^[3-7] and abroad.^[8-11] A study done by Deshmukh et al. found better compliance to Iron folic acid (IFA) tablet consumption in rural areas as compared to urban areas and another study from rural Wardha reported perceived benefits to adolescent girls such as an increase in appetite and reduction in scanty menses, tiredness, and weakness, acted as positive factors for better compliance with weekly iron supplementation.^[3,4]

The Ministry of Health and Family Welfare, India has launched the Weekly Iron and Folic Acid Supplementation (WIFS) program for school-going adolescent girls and boys and for out-of-school adolescent girls. The Government of

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Pondicherry has initiated WIFS program for government school children from 6th to 12th standard since March 2013. These adolescents are given weekly supplementation with iron and folic acid (100 and 0.5 mg, respectively) tablets on every Monday by their teacher for the whole year. Deworming with Albendazole is done every 6 months. Auxiliary nurse midwife (ANM) and health assistants (HA) from the primary health centre (PHC) supply iron and folic acid (IFA) tablets on monthly basis in advance to each school. In each school, there is one teacher in charge for WIFS who is assigned the duty of distribution of the tablets to students. Since, this program is newly initiated, it was considered crucial to explore the compliance and “for and against” forces for it so as to facilitate its future implementation in a community setting.

Material and Methods

Study Setting

The primary health-care system in Pondicherry consists of 12 urban health centers and 15 rural primary health centers (PHCs). A rural PHC at Thirubhuvanai, which comes under the service area of the Department of Community Medicine, Sri Manakula Vinayagar Medical College and Hospital, was selected. The Thirubhuvanai PHC covers a population of 34,108 and has 2,354 adolescents studying in five government schools.

Study Design

It was a mixed-methods study design, where quantitative (survey) and qualitative (key informant interviews [KIIs]) methods were used.

Study Participants

Adolescents were from 6th to 12th standard in five government schools under Thirubhuvanai PHC. Key informants were teachers who were in charge of WIFS in their schools, HAs, and ANM of PHC. Study duration was from September 2013 to March 2014.

Sample Size and Sampling

Considering the compliance of adolescents to IFA tablets as 50%, precision at 7.5%, alpha 5% with design effect 2, the sample size was 342, calculated using the Epi Info software (version 6.04). From 6th to 12th standard in the five government schools, there are 2,343 students in 27 classes. From these 27 classes (clusters), 8 classes (clusters) were selected by systematic random sampling. In every selected cluster (class), 55 students were included in the study, considering the nonresponse rate of 20%.

Quantitative Data Collection

Prior appointment was taken from the school principal and the class teachers for the survey. In each of the eight classes, 43 students who consented to participate were randomly selected. Pre-tested questionnaire was used for data collection.

A trained team of assistant professors, postgraduates, medical social worker, and medical interns collected the data after obtaining informed consent. Study participants were given a self-administered questionnaire in Tamil language. The filled-in questionnaires were checked for their completeness at the time of their collection.

Qualitative Data Collections

KIIs were conducted for three teachers who were in charge of WIFS in their respective schools, one ANM, and two HAs from the PHC using an interview guide. Written informed consent was taken before the interview. KII was conducted by two assistant professors, and postgraduates who were trained in qualitative research methods. The guidelines for KII by UCLA Center for Health Policy Research were used.^[12] The interviews were audio-recorded after consent from the respondents. Field notes were taken from three schools at the time of weekly distribution of IFA tablets.

Data Analysis

Analysis was done using Epi Info (version 3.4.3). The manual content analysis of information obtained in KII was done by a postgraduate and three faculties trained in qualitative methods.

Clearance from the Institutional Ethics Committee was obtained. Permission was also obtained from the respective school principal and informed consent was taken from the parents/guardians of the students.

Results

Background Information of the Participants

Quantitative data analysis revealed that out of 345 participants, there were 110 boys and 235 girls. The mean age of boys was 13.07 ± 1.42 years and for girls, 13.51 ± 1.81 . The majority, 212 (61.4%), of the participants reported their mothers' education up to secondary level. The majority, 271 (78.55%), of the participants reported their fathers' employment as unskilled workers. There were no sex differentials ($p < 0.01$) in the age of the participants, education of mothers of the participants, and occupation of the participants' fathers [Table 1].

As seen in Table 2 significantly the girls had better knowledge about symptoms of anemia ($p=0.03$) and iron rich ($p=0.001$) diet than boys. The percentage of boys and girls who reported correctly the symptoms of anemia as tiredness, breathlessness, loss of appetite were 74 (67.3%) and 182 (77.4%) respectively. The majority of the participants 306 (88.7%) answered correctly that tablet contains iron and folic acid and there was no significant difference between the boys and girls. The percentage of boys and girls who correctly reported at least 3 iron rich food were 28 (25.4%) and 111 (47.2%) respectively.

The advice that iron and folic acid (IFA) tablets are good for health and should be taken regularly was received by

Table 1: Background features of the participants

Variables	Options	Boys (%) (n = 110)	Girls (%) (n = 235)	Total (%) (n = 345)	χ^2 value, df, p-value
Age of participants	Age (mean \pm SD)	13.07 \pm 1.42	13.51 \pm 1.81		*p = 0.027
	Illiterate	17 (15.45)	47 (20)	64 (18.55)	
Education of mother	Primary	13 (11.81)	39 (16.59)	52 (15.07)	4.05, 3, 0.26
	Secondary	76 (69.09)	136 (57.87)	212 (61.4)	
	Higher secondary and graduates	4 (3.63)	13 (5.53)	17 (4.9)	
Occupation of father	Unemployed	12 (10.90)	24 (10.21)	36 (10.43)	0.163, 2, 0.92
	Unskilled	85 (77.27)	186 (79.14)	271 (78.55)	
	Semiskilled, skilled, clerk, shop owner	13 (11.81)	25 (10.63)	38 (11.01)	

*t-test was used.

Table 2: Knowledge about symptoms of anemia, tablet they are consuming, and iron-rich food among boys and girls

Variables	Options	Boys (%) (n = 110)	Girls (%) (n = 235)	Total (%) (n = 345)	χ^2 value, df, p-value
Symptoms of anemia	Tiredness, breathlessness, loss of appetite	74 (67.3)	182 (77.4)	256 (74.2)	6.99, 2, 0.03
	Headache, fever, body pain	30 (27.3)	36 (2.5)	66 (19.1)	
	Cold, cough, throat pain	6 (5.4)	17 (7.2)	23 (6.6)	
Tablets	Iron and folic acid	96 (87.3)	210 (89.4)	306 (88.7)	1.913, 2, 0.38
	Calcium	6 (5.4)	6 (2.5)	12 (3.5)	
	Vitamins and others	8 (7.3)	19 (8.1)	27 (7.8)	
Iron-rich food	0-1 food item	27 (24.5)	25 (10.6)	52 (7.2)	0.001
	2 food items	55 (50)	99 (42.1)	152 (44)	
	3 food items	28 (25.4)	111 (47.2)	138 (40)	

280 (81.2%) of participants from their parents and 279 (80.9%) of participants from their friends. The majority, 256 (70.1%), of the participants reported that the most motivating role in taking IFA tablet regularly is played by their teachers.

About 287 (83.1%) participants reported an improved sense of well-being, 45 (13%) reported reduction in tiredness, and 13 (5.3%) reported weight gain as the major benefits from IFA tablet consumption. The majority, 302 (87.5%), of the participants did not have any side effects. Remaining 25 (7.2%) reported nausea and vomiting and 18 (5.2%) reported abdominal pain.

The majority, 296 (85.8%), of the students reported to consume four tablets in the past 4 weeks and were considered to be compliant as per our operational definition. The students, 49 (14.2%), who consumed less than four tablets in the past 4 weeks were considered to be noncompliant. There was no sex differential with reference to compliance between boys and girls [Table 3].

The reasons for noncompliance reported by the 49 non-compliant students were absenteeism, 27 (55.1%); tablets were powdery, 11 (22.4%); and side effects, 11 (22.5%). There was no sex differential with reference to the reason for compliance between boys and girls [Table 4].

As shown in Table 5, the majority, 243 (70.4%), of the participants reported benefits such as improved sense of well-being as a most positive factor for the program. Many, 131 (37.9%), of the participants reported that there are no negative factors for the program. Rest mentioned

Table 3: Number of tablets consumed in the last 4 weeks according to gender

Options	Boys (%) (n = 110)	Girls (%) (n = 235)	Total (%) (n = 345)	χ^2 value, df, p-value
0-1 tablet	5 (4.5)	15 (6.3)	20 (5.8)	1.44, 2, 0.48
2-3 tablets	7 (6.3)	22 (9.3)	29 (8.4)	
4 tablets	98 (89.1)	198 (84.2)	296 (85.8)	

Table 4: Reasons for noncompliance

Options	Boys (%) (n = 12)	Girls (%) (n = 37)	Total (%) (n = 49)	χ^2 , df, p-value
Side effects	2 (16.6)	9 (24.3)	11 (22.5)	0.31, 2, 0.85
Absenteeism	7 (58.3)	20 (54)	27 (55.1)	
Tablet became powdery	3 (25)	8 (21.6)	11 (22.4)	

Table 5: Positive, negative factors, suggestions for WIFS program, according to the participants

Variables	Options	Boys (%)	Girls (%)	Total (%)
		(n = 110)	(n = 235)	(n = 345)
Positive factors	Benefits like improved sense of well-being	84 (76.3)	159 (67.6)	243 (70.4)
	Motivation by parents, teachers and friends	26 (23.6)	76 (31)	102 (29.6)
Negative factors	Adverse effects, such as nausea	24 (21.8)	58 (24.6)	82 (23.7)
	Discouragement from friends, parents	46 (41.8)	86 (36)	102 (29.5)
	No defect	40 (36.3)	91 (38.7)	131 (37.9)
Suggestion to the program	The tablet should be very small, with good color and smell	25 (22.7)	41 (17.4)	66 (10.2)
	Need other supplements, such as vitamins	57 (51.8)	109 (46.38)	166 (48.11)
	No change required	28 (25.4)	85 (36.1)	103 (29.8)

Table 6: Following facilitating factors and constraints were reported in the key informant interviews of the health assistant (HA), ANM of PHC, and teacher who is in charge of WIFS

Facilitating factors	Constraints
Teachers in-charge of WIFS supervised the weekly intake of IFA tablets and enquired if all students had lunch prior to tablet ingestion.	Students misinterpret abdominal pain due to other causes like dysmenorrhoea to IFA tablets.
Teachers motivated students to take the tablet regularly by telling the beneficial effects of IFA tablets.	The compliance of IFA tablets at home during vacation was less.
The medical officer, HA, and ANM gave health education to the students.	WIFS puts extra burden on the workload of the teachers.
The supply of IFA tablets was regular.	Parents of the students may be given health education.
There was demand from students, parents, and management of private schools for starting WIFS in private schools. The reason was they were seeing the health benefits to students in government schools after implementation of WIFS.	
The teacher told that students absent on the day of distribution of the IFA are given the tablet on the next day.	

discouragement from friends, parents 102 (29.5%), adverse effects like nausea 82 (23.7%) as the common negative factors. The suggestions given by the participants about WIFS were need for other supplements such as vitamins, 166 (48.11%); and the tablet size to be very small, with good color and smell, 66 (10.2%).

Qualitative data analysis revealed that the facilitating factors as reported by key informants for the program were (1) supervision by the teachers; (2) motivation by the teachers; (3) health education by the medical officer, ANMs, and HAs; (4) regular supply of tablets; (5) demands from students, parents, and management of private schools for WIFS; and (6) absent students are given tablets on the next day.

The constraints as reported by key informants were (1) attribution of abdominal pain due to other causes to IFA tablet consumption; (2) low compliance for IFA tablets at home during holidays; (3) extra workload on teachers; and (4) lack of health education to parents [Table 6].

The nodal teachers reported that the compliance to IFA tablets was approximately 85%. This information co-related well with the quantitative results of the study.

Field notes at the time of weekly distribution of IFA tablets

Good practices: The distribution of IFA tablets to students was done in post-lunch classes by in-charge teacher with the help of the class teacher on every Monday. The teacher enquired whether every student had taken lunch. Some of the students had carried their own drinking water in water bottles.

Areas for improvement: In one out of three schools, the place of distribution of IFA tablets was not hygienic. During distribution, a student dropped her tablet and she was instructed by her class teacher to take the tablet from the ground and swallow it. Some of the students did not have footwear.

Discussion

In this study, the majority (85.8%) of the students reported taking four tablets in the past 4 weeks. The major reasons for noncompliance of IFA tablets reported were absenteeism (55.1%), powdery tablets (22.4%), and side effects (22.5%) such as nausea and vomiting. The majority (70.4%) of the participants reported benefits such as an improved sense

of well-being, reduction in breathlessness, and tiredness. Significantly the girls had better knowledge about symptoms of anemia and iron-rich diet than boys. As reported by students (70.1%), teachers played a motivating role in IFA tablet consumption. As reported in KII, there is increasing demand from private schools for starting WIFS, where it is yet to be initiated. After this study, the brand of IFA tablets was changed and better quality IFA tablets that do not become powdery were issued.

Guided by the empirical evidence, the WIFS program has been launched since January 2013, under the National Rural Health Mission (NRHM) in government/aided and municipal schools all over India. All states and union territories have proposed the procurement of IFA and Albendazole in the Program Implementation Plan 2012–2013.^[1] Government of Pondicherry has started WIFS from March 2013.

Being a new program, its evaluation is yet to be done in Tamil Nadu and Pondicherry. A study in rural central India found IFA compliance of 42.4%, where girls consumed 10–12 tablets. The girls who were able to tell three iron-rich food were 52.8%. In the force field analysis, the main positive forces were perceived benefits such as increased appetite, reduction in tiredness, and motivation by health workers, and the major negative force were a demand for syrup, side effects, such as vomiting and diarrhea, and doubts about benefit of supplemental iron. In this study, the compliance was reported to be 85.8%, which indicates that the program is well implemented and received by the local community. The adolescents who were able to report three iron-rich foods were 40%. Hence, health education component needs to be improved. This study also found the similar positive factors such as sense of well-being, motivation by parents, teachers, and friends, supervision teachers, and health education by PHC staff, and the major negative factors were side effects such as nausea.

In the study done by Kumar et al. in Vadodara schools, it was found that the teachers, parents, and peers were the influencing factors. The factors that worked for implementation at field level were education, motivated school management, supportive supervision. The limitation in this program was the perception among private schools that WIFS is targeted to girls belonging to a low socioeconomic class.^[13] The adolescents in our study area also reported similar findings that teachers, parents, and peers were the influencing factors and school teachers played the most motivating role in taking IFA tablets regularly. In this study, the positive factors for the program were reported to be IFA distribution under supervision, health education, adequate supply of IFA tablets, benefits to students such as feeling healthy, and motivation by parents, teachers, and friends. The negative factors reported were side effects, extra workload on teachers, etc. In contrast to what was observed in Vadodara, a demand was reported from school management, students, and parents in private schools for starting WIFS in private schools. This was due to the improvement in health seen in government school children after implementation of WIFS.

As key informants, teachers reported that the students absent during IFA distribution were given tablets the next day, but in cross-sectional study the majority (55.1%) of the students who were noncompliant reported absenteeism as the cause for noncompliance. The majority (81%) of students reported that their parents and friends have advised IFA tablets are good for health, but still some (29.5%) have answered discouragement by parents and friends as a negative force. Health education of the parents should be done so that compliance to IFA at school and during vacation will increase.

Limitation of the study is that this study did not cover the part of the program implemented through *Anganwadi* centers. The study was performed in a small geographic area.

Conclusion

Thus, the program has ensured good compliance to IFA tablet consumption among school students. However, to strengthen the program further, awareness about side effects on IFA tablets consumption and health education component for students about iron-rich diet should be strengthened. The parents also should be educated about the importance of IFA consumption. Regarding the supply, the IFA tablets should be ensured of good quality. The major strengths of this study were use of self-administered questionnaire to avoid social desirability bias. The perspectives of students, teachers, and PHC staff were also captured.

Overall, the WIFS program is well implemented with good compliance. Improvements can be made by improving the quality of IFA tablets, awareness about side effects of IFA tablets consumption, and health education about iron-rich diet.

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