Original Research Article

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20171785

Adherence to weekly iron and folic acid supplementation among the school students of Thrissur corporation – a cross sectional study

Sajna M. V.1*, Shefaly Ann Jacob²

¹Department of Community Medicine, Government Medical College, Thrissur District, Kerala, India ²Eranakulam, Kerala, India

Received: 11 March 2017 Accepted: 03 April 2017

*Correspondence: Dr. Sajna M. V.,

E-mail: mvsajna@yahoo.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Anemia is one of the major problems among adolescents in India. As daily and once weekly supplementation of iron and folic acid show same effects in terms of growth rate, it has been decided that weekly supply is an effective method to tackle anaemia. The adherence to these tablets is an important factor to monitor the programme.

Methods: A cross sectional study was conducted among the school students of 6-10th classes in Thrissur corporation area for a period of 6 months regarding the adherence to weekly iron and folic acid tablets. Sample size was calculated based on a pilot study and for a cluster sampling technology. After getting consent, data were collected, coded and analysed using SPSS17.

Results: 380 students participated in the study. Mean age of the population was 13.01 ± 1.3 years (with a range of 10 – 16 years). Only 139 (36.6%) students took tablets initially for a period of 1-2 months. Among the total girls, 124 (34.6%) took tablets initially. Of the students who took initially, 57 were continuing intake of iron tablets. The adherence to weekly iron and folic acid tablets for at in this study was 15% (n=57). Among the students who initially consumed tablets 36.6% reported stomach ache. Nausea (13.6%), vomiting (10.7%), black stool (9.3%), diarrhoea (5%) were other reported side effects of the drugs.

Conclusions: The adherence to weekly iron and folic to this study was less. This can be effectively improved with continued health education sessions using different methods including the parents.

Keywords: Adherence, Weekly iron and folic acid supplementation, Cluster sampling

INTRODUCTION

Anaemia affecting more than 1.5 billion people world-wide is primarily caused by iron deficiency, causing decreased physical capability, hindering development socially and economically. Anaemia during pregnancy predisposes mothers to a risk of preterm delivery and is linked with an increased maternal death, impaired foetal growth, low birth weight and increased neonatal mortality. Anaemia leads to

iron deficiency in infants, thus affecting their physical and cognitive development.⁷⁻⁹ This will compromise mother's and her child's mental health.^{10,11} Low intake and absorption of dietary iron contribute to anaemia and iron deficiency in women in developing countries especially, those in their reproductive years, which starts around mid-adolescence.⁶

Adolescence is characterized by physical, biological and hormonal changes resulting in psycho-social, behavioural and sexual maturity in individuals. Adolescent girls in particular are more vulnerable to anaemia due to rapid growth of the body and loss of blood during menstruation.

According to NFHS -III data, over 55% of both adolescent boys and girls in India are anaemic. 2%, 15% and more than 39% of adolescent girls suffer from severe, moderate and mild anaemia respectively.7 As daily and once weekly supplementation of iron and folic acid show same effects in terms of growth rate, it has been decided that weekly supply is an effective method to tackle anaemia.8 With the growing burden on human and economic resources caused due to increased incidence and prevalence of anaemia in the nation, the Government of India, under the Ministry of Health and Family Welfare has launched the WIFS (weekly iron and folic acid supplementation) programme. This is aimed at introducing the adolescents of the country to the nutritional supplementation, with the noble motive of reducing the size of anaemia-struck young population, by correction of the prevalent status of anaemia and prevention of further children being affected. The objectives of the study were as follows

- 1. To study the adherence to the weekly iron and folic acid supplementation among the school students of Thrissur corporation.
- To study the side effects reported among these students.
- To assess the reasons for non-adherence to the weekly iron and folic acid supplementation programme.

METHODS

This was a community based cross sectional study conducted in the schools of Municipal Corporation of Thrissur District, which is situated in the central part of Kerala. Thrissur District is the cultural capital of Kerala where the 67.2% of the population resides in the urban area. The study participants were students of the classes from standards 6-10 whose parents have given consent for their wards participation in the study. Students who were absent on the two successive days of data collection were excluded from the study. The study period was from December 2014 to May 2015 which included 3 months of data collection.

Reported studies on adherence to weekly iron and folic acid supply among school students was limited and as per Rajashree et al compliance to weekly iron was 35.9 % among adolescent girls. A pilot study was done in one class and the adherence was 35%. Based on this, sample size was calculated using the formula 4pq/d². With 80% power and 20% allowable error, the sample size obtained was 186. Since cluster sampling technique was adopted, design effect has to be considered. N= 4pq/d² X 2 (design effect). Hence the sample size was 372. Cluster sampling technique was used in the study. Each school in the corporation area of Thrissur was considered as one

cluster. There were 21 schools in Corporation area of Thrissur. From this 2 schools were selected randomly using the lottery method.

The protocol was submitted to Institutional research Committee and institutional ethics Committee of Government Medical College, Thrissur and got approval before data collection. A self-administered semistructured questionnaire was developed in the local language. An informed consent was taken both from the school headmaster and parent teacher association. School health junior public health nurse was informed regarding the study. Detailed information regarding objectives and questions in the questionnaire was given to her. A prior informed consent letter was sent to the homes of the participating students on the previous day of data collection. All the selected students, whose parents gave consent, were directed to fill the questionnaire in the presence of junior public health nurse (JPHN). School health junior public health nurse was directed to verify and clarify the filled data. Collected data were coded and entered in MS Excel and analysed using SPSS 17. Adherence was assessed as proportion with 95% confidence interval. Association of factors adherence as well as non-adherence was assessed using Chi square test. The significant level was kept at 5%.

RESULTS

Calculated sample size was 372. There were 410 eligible students in the schools. Among this 380 participated in the study with a response rate of 92%. Power of the study was calculated using the initial adherence and was 86%. The results of the study was tabulated and discussed. The selected schools were one Government school and one aided school. Students from 6^{th} standard to 10^{th} standards participated in the study. All ages from 10 years to 16 years participated. Mean age of the population was 13.01 ± 1.3 years (with a range of 10-16 years). Majority of the students belongs to 14 years. Age distribution is given in the Table 1.

Table 1: Distribution of the children according to age.

Age (years)	Frequency	Percent
10	3	0.8
11	50	13.2
12	99	26.1
13	62	16.3
14	122	32.1
15	41	10.8
16	3	0.8
Total	380	100

In the study group 358(94.2%) were girls and 22 (5.8%) were boys. Majority of the children (87.9%) belonged to nuclear family. Only 44 (11.6%) children were from joint family. 2 children were from NSS balabhavan. On comparison of educational status of mothers and fathers,

mothers were found to have higher educational status. Educational status especially mothers can play a role in the student's health. If they are of higher educational status information can be easily passed regarding the importance of the adherence to the drugs.

Adherence to weekly iron and folic acid supplementation among the students

This study enquired about the intake of iron and folic acid tablets initially as well as continuous intake. Adherence was assessed by asking the continuous consumption of iron and folic acid tablets for the past 6 months of data collection. The tablets were supplied in the schools on Mondays by the class teachers and school health junior public health nurse. Due to parental concern of side effects students were directed to have the tablets in the home after the class in one of the schools as per the meeting conducted with health authorities in the school.

1. Initial adherence of Iron and folic acid

Majority of the children (n=369, 97.8%) responded that iron supply was on Mondays. Among the participants, only 305 (80.3%), students were aware regarding the advantages of weekly iron supply. Only 145 (38.2%) children reported that the iron tablets were given by school health junior public health nurse.

Only 139 (36.6%) students took tablets initially for a period of 1-2 months. Among the total girls, 124 (34.6%)

took tablets initially. When compared with this, the proportion of boys who consumed tablets was high i.e 15 (68.2%). The difference found was statistically significant (Chi square- 10.05, p 0.0015). Regarding the type of school, the proportion of initial consumption was statistically high in Government school (76.7%) when compared with Aided school (31.5%). This may be due to several factors like easiness to implement when the total number of children in the school was less or may be due easiness to health educate the parents of children coming to Government school. The difference in the proportions of consumption is given in the Table 2.

2. Adherence to the weekly iron and folic acid supplementation (WIFS) in the study group for the past 6 months

Among the children who took the tablets initially, 57 were still continuing intake of iron tablets. Hence the adherence to weekly iron and folic acid tablets for at in this study was 15% (n=57) with 95% confidence interval of 11.4-18.6. Adherence was high with boys (80%) when compared with girls (36.3%). This difference was found to be statistically significant. The adherence noted in the study is shown in the Table 3 and 4. As per NFHS III 55% of our adolescent girls and boys is anaemic. There was a statistically significant high adherence to WIFS among the students of Government school (76.7%) when compared with Aided school (31.5%) in this study. So if this situation of low adherence to the tablets is continued further, the objective of reduction of the prevalence of anaemia will be difficult to achieve.

Table 2: Relation of initial adherence with gender and type of school.

Factor	Initial adherence	Initial adherence	
	Yes (%)	No (%)	Chi square & p value
Gender			
Boys	15(68.2%	7(22%)	$\chi^2 - 10.05$. p-0.0015*
Girls	124(34.6%)	234(65.4%	
Type of School			
Government	33(76.7%)	10(23.3%)	$\chi^2 - 31.79$. p- 0.000*
Aided	106(31.5%)	231(68.5%	

Table 3: Distribution of study population according to adherence to WIFS.

	No (%)	95% CI
Initial adherence of tablets in the study	139 (36.6)	31.6-41.6
Adherence to WIFS	57 (15%)	11.4-18.6

Table 4: Association of gender, type of school with adherence.

Factor	Adherence to WIFS		Chi square & pvalue	
	Yes (%)	No (%)	Cili square & pvalue	
Gender				
Boys	12(80%)	3(20%)	$\chi^2 - 8.83 \text{ p-0.0002*}$	
Girls	45(36.29%)	79(63.71%)		
Type of School				
Government	12(80%)	3(20%)	$\chi^2 - 10.1 \text{ p- } 0.001*$	

Aided 42(33.9%) 82(66.1%)

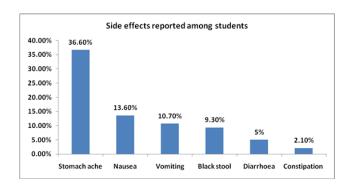


Figure 1: Proportion of students according to the reported a side effects after intake of iron and folic acid tablets N=139.

Side effects reported among the students

To study the side effects, subgroup analysis was done. Those students who consumed iron and folic acid initially were taken as denominator for calculating this. Side effects reported by the students were predominantly gastrointestinal symptoms. Most frequently reported was stomach ache. Among the students who initially consumed tablets 51(36.6%) reported stomach ache. Nausea (13.6%), vomiting (10.7%), black stool (9.3%), diarrhoea (5%) were other reported side effects of the drugs. The frequency of each side effect is given in the Figure 1.

Table 5:	Comparison	of adherence	with reported	side effects.

Symptom	Adherent	Not adherent	Chi square	Pvalue
Stomach ache	16(31.4%)	37(44.1%)	2.13	0.14
Nausea	6(31.6%)	51(43.2%)	0.49	0.48
Vomiting	5(33.3%)	52(41.9%)	0.13	0.71
Black stool	6(46.15%)	51(40.5%)	0.15	.69
Diarrhoea	3(42.9)	54(40.9%)	0.08	0.77
Constipation	2(66.7%)	1(33.3)	0.10	0.74

Table 6: Reasons for not having the tablets a.

Reason	Number	%
Nil	156	64.7
Fear of problems	30	12.4
Stomach ache	19	7.9
Parents not consented	17	7.1
Having another tablets	6	2.5
Vomiting	5	2.1
Information from News Paper	4	1.7
No faith in Tablets	3	1.2
Not a prescription by a Doctor	1	0.4
Total	241	100

This study analysed the association of the reported side effects with adherence to the medicines. No statistically significant difference was found with presence of side effects and continuation or adherence of the drugs. Relation with different symptoms and adherence is shown in the Table 5. Presence of side effects was not a significant factor in the non-adherence in this study.

Reasons for not taking the iron and folic acid

Most of the students, 64.7% (n= 157) among those who did not take iron and folic acid, responded that there were no specific reasons for not having the tablets. The

students pointed out different reasons for nonconsumption of iron which are shown in the Table 6. All the reasons listed are correctable by taking necessary actions in appropriate phases.

The students were enquired about the symptoms of anaemia; most of them were having the same. The distribution of students having the symptoms is shown in the Figure 2. Majority of the students were having lack of concentration, fatigue, head ache etc. If they were well informed regarding the importance and benefits of iron tablet they would have taken the drug.

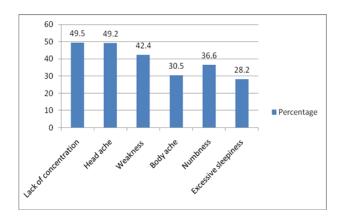


Figure 2: Distribution of students having symptoms of anaemia.

DISCUSSION

In iron deficiency, decreased brain iron stores may impair the activity of iron-dependent enzymes necessary for the functioning, and degradation synthesis, neurotransmitters and produce scholastic underachievement or behavioral disturbances in school children. 11-13 Iron thus plays a vital role in cognitive development of growing children and adolescents. Studies indicate that iron supplementation has positive effects on hemoglobin (Hb) levels and growth. ^{14,15} It may also have beneficial impact on cognitive abilities, in young women. 16 A significant number of studies have been completed around the world - including three research studies in India - on the efficacy and effectiveness of intermittent iron supplementation. A meta-analysis of these studies concluded that weekly supplementation of iron to children and adolescents was as effective as daily supplementation, if the drugs were delivered under supervision and ensuring compliance.¹⁷

The compliance or adherence to the drugs is more important for the effectiveness of the intervention. The adherence is very low (15%) in this study which was compared with the low compliance reported after 5 weeks in a study done by Sani et al among young collegiate in Jaipur. 18 As per the study conducted by Bhatt et al in Ahamedabad, only 34% of adolescent girls continued to be compliant with weekly iron tablets when compared with the present study. 10 In another Study undertaken among adolescent girls for 3 months showed higher level of compliance (95%) with supplements and counselling, in case of irregular consumption of tablets (Bhanushali et al). Continuous weekly iron supplementation without regular counselling can lead to decrease in adherence which results in the failure of the programme. This can be corrected with proper counselling and health education of parents. Regular surveillance of side effects should be done. Focus group discussions among the parents can bring about actual apprehension behind the nonadherence.

In this study there was significantly higher adherence to iron and folic acid among boys as well as among students belonged to Government school. The total number of students in Government school was less when compared with Aided school. This might be the reason for increased adherence in this School as it was easy to observe for lesser number of students. More number of Teachers should be made in charge so that number of students monitored by each Teacher will be less which can increase compliance.

In a state like Kerala where there is high enrolment rate in school and with a high literacy rate, the implementation of this programme should be more practical and increased adherence is expected. Improper awareness regarding the programme as well as fear of side effects among the parents may be the actual reasons behind the non-adherence. The reasons for not taking the tablets were non-specific in this study.

It will be easy to implement this programme if the parents were well informed regarding the importance of this weekly intake of iron and folic acid. Most of the parents will be concerned about the possible side effects that can happen with these tablets. The same drugs will be given to their children if it were prescribed by a Doctor. So to fill the gap of unawareness, various measures should be undertaken by the health authorities along with school authorities and parent teacher association.

Information to the parents is given during parent teacher association meeting usually. Number of the parents who attend a parent teacher association meeting or a health education session is minimal. Moreover one session of health education will not be effective for adherence. Hence focus group discussions, workshops involving parents, teachers and health care professionals should be done periodically to ensure adherence. There should be measures to tackle side effects reported if any. It was noted that a higher percentage of common gastro intestinal side effects in the non-adherent group in the present study even though this was not statistically significant. As per WHO, health and nutrition education improved acceptance of WIFS and compliance in intervention studies conducted in Bihar, Gujarat, Madhya Pradesh and Uttar Pradesh. More than 80% compliance was noticed in that intervention studies.¹⁹

As per the guidelines this tablets should be given after food. This should be supplied to the children and consumed under supervision in the class itself on Monday afternoon. Most of the gastrointestinal symptoms can be avoided if it is taken after food. For schools, the Egyptian programme considered Monday to be the most suitable WIFS day, since attendance of students was reported to be highest on that day and the scope of tracking a dropout case within the week itself was considered most practical. The WIFS programme of Gujarat used Wednesday as the WIFS day since, in consultation with school authorities, it was found that this was the most

common day for not observing any religious fast. In the Philippines, Tuesday was declared WIFS Day, since Wednesday was the fixed immunization day, and therefore the most appropriate and practical day for undertaking follow-up monitoring by the health immunization team. ¹⁹ Hence it will be good if area specific day can be chosen for the programme.

Class teacher should ensure the consumption of the tablets after confirming the food intake of students before the supply of the tablets. Gastrointestinal symptoms will be more if it is taken in empty stomach. Moreover it may have some benefits in increasing the adherence if we apply screening programme to detect anemia before starting the programme. Surveillance system for any side effects should be strengthened. Monitoring of the programme should be strengthened. The reported studies on the compliance or adherence of the weekly iron and folic acid supplementation are limited. It is high time to conduct and report on adherence in different settings. More studies regarding various aspect of the programme should be conducted.

Limitation of this study: We could not meet parents to clarify the reasons for non-consumption.

ACKNOWLEDGEMENTS

We acknowledge Institutional research committee of Government Medical College for the funding and supporting of this project.

Funding: Institutional research committee of Government Medical College

Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- 1. Horton S, Ross J. The Economics of Iron Deficiency. Food Policy. 2007;32(1):141-3.
- 2. Scholl TO, Hediger ML, Fischer RL, Shearer JW. Aneamia Versus Iron Deficiency: Increased Risk Of Preterm Delivery In A Prospective Study. Am J Clin Nutr. 1992;55(5):985-8.
- 3. Allen LH. Aneamia And Iron Deficiency, Effects On Pregnancy And Outcome. Am J Clin Nutr. 2000;71(5 Suppl):1280S-4S.
- 4. Hindmarch PC, Geary MP, Rodeck CH, Jackson M R, Kingdom J C, Effect Of Early Pregnancy On Placental Weight Structure, Lancet. 2000;356(9231):719-23
- 5. Kadyrov M, Kosanke G, Kingdom J, Kaufmann P: Increased Fetoplacental Angiogenesis During First Trimester In Anaemic Women, Lancet. 1998;352(9142):1747-9.

- WHO: Iron Deficiency Anaemia- Assessment, Prevention And Control. A Guide For Programme Managers, 2001.
- Ministry Of Health And Family Welfare, Government Of India: Operational Framework: Weekly Iron And Folic Acid Supplementation Programme For Adolescents.
- 8. Bilimale A, Anjum J, Sangolli HN, Mallapur M. Improving Adherence To Oral Iron Supplementation During Pregnancy, Australasian Med J. 2010;3(5):281.
- 9. Census of India 2011- Rural urban distribution.
- 10. Bhatt RJ, Mehta HK, Khatri V, Chhaya J, Rahul K, et al. A study of access and compliance of iron and folic acid tablets for prevention and cure of anaemia among adolescent age group females in Ahmedabad district of India surveyed under multi indicator cluster survey 2011. Global J Med Public Health. 2013;2(4):1-6.
- 11. Erikson KM, Jones B, Beard JL. Altered functioning of dopamine D1 and D2 receptors in brains of iron deficient rats. Physiol Pharmacol Behav. 2001;69:409-18.
- 12. Pollitt E, Liebel RL. Iron deficiency and behaviour. J Pediatr. 1976;88:372-81.
- 13. Sen A, Kanani SJ. Deleterious functional impact of anemia on young adolescent school girls. Indian Pediatr. 2006;43:219-26.
- 14. Kanani S, Poojara RM. Supplementation with IFA enhances growth in adolescent Indian girls. J Nutr. 2000;130:452S-5S.
- 15. Lawless JW, Latham MC, Stephenson LS, Kinoti SN, Pertet AM. Iron supplementation improves appetite and growth in anemic Kenyan primary school children. J Nutr. 1994;124:645-54.
- 16. Murray-Kolb L, Beard JL. Iron treatment normalizes cognitive functioning in young women. Am J Clin Nutr. 2007;85:778-87.
- 17. UNICEF Briefing Paper Series Innovations, Lessons and Good Practices, The Adolescent Girls Anaemia Control Programme- Breaking the Inter-Generational Cycle of Under nutrition in India with a focus on Adolescent Girls 2011.
- 18. Soni D, Siddhu A, Bansal PG, Toteja GS. Acceptability and Compliance of Weekly Iron-Folic Acid Supplementation Among Young Collegiate Girls (17-18 Years) Under Free Living Conditions. Indian J Applied Res. 2015;5(1):534-7.
- 19. WHO Western Pacific Region -Weekly iron and folic acid supplementation programmes for women of reproductive age: An analysis of best programme practices, 2011.

Cite this article as: Sajna MV, Jacob SA. Adherence to weekly iron and folic acid supplementation among the school students of Thrissur corporation – a cross sectional study. Int J Community Med Public Health 2017;4:1689-94.