ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

Original Research Article

ASSESSMENT OF IMPACT OF WEEKLY IRON FOLIC ACID SUPPLEMENTATION PROGRAMME AMONGST SCHOOL GOING ADOLESCENTS IN BHOPAL, MADHYA PRADESH- A LONGITUDINAL STUDY

Dr. Prachi Kori[1] (Senior Resident), Dr. Preeti Kori[2] (Associate Professor), Dr. Sohan Mandloi[3] (Associate Professor) & Dr. Shivangi Rajput[4] (Tutor)

Department of Community Medicine, Index Medical College Hospital and Research Centre, Indore, (M.P.)[1]
Department of Medicine, Dr LN Pandey Govt. Medical College Ratlam, (M.P.)[2]
Department of Medicine, Dr LN Pandey Govt. Medical College Ratlam, (M.P.)[3]
Department of Biochemistry, Dr LN Panday Government Medical College Ratlam, (M.P.)[4]
Corresponding Author: Dr. Shivangi Rajput

ABSTRACT

Background: WHO estimates the number of anemic people worldwide to be a staggering two billion with approximately 50% of all anemia attributable to iron deficiency[1]. The Ministry of Health and Family Welfare has launched the Weekly Iron and Folic Acid Supplementation (WIFS) Programme in 2012 in India to combat the high prevalence and incidence of anemia among adolescents[4]. So this study was planned to assess impact of Weekly Iron Folic acid Supplementation programme (WIFS) amongst adolescents in selected government schools of Bhopal district.

Materials and Methods: This is a Longitudinal community based study done after ethical committee approval, in randomly selected government schools of Bhopal (M.P.), India.

Results: At baseline prevalence of anemia is 32.8% among boys and 57.4% among girls. At follow up prevalence of anemia is 30.5% among boys and 55.8% among girls. At baseline prevalence of mild, moderate and severe anemia was 18.8%, 10.2% and 3.9% in males respectively and prevalence of mild, moderate and severe anemia was 36.4%, 14% and 7% in females respectively. At follow up prevalence of mild, moderate and severe anemia was 19.5%, 7.8% and 3.2% in males respectively and prevalence of mild, moderate and severe anemia was 38.8%, 11.6% and 5.4% in females respectively. 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. All these findings were found to be statistically significant.

Conclusion: Weekly iron–folic acid (IFA) supplementation combined with deworming biannually is a feasible and cost effective intervention for the prevention of anemia in adolescents in institutional settings**.** The importance of the IFA tablets and albendazole

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

tablets in the prevention of iron deficiency anemia is needed to be educated by information, education and communication by social media also.

Keywords: Anemia, WIFS programme , School going, IFA tablets.

1. INTRODUCTION

Anemia is currently one of the most common and intractable nutritional problems globally. WHO estimates the number of anemic people worldwide to be a staggering two billion with approximately 50% of all anemia attributable to iron deficiency[1]. Iron deficiency anemia occurs at all stages of the life cycle, but is more prevalent in pregnant women and young children. Adolescents are also vulnerable to iron deficiency[2]. The prevalence of anemia in India is higher than many other countries due to multiple factors. Predominant vegetarianism, peculiar food habits, cultural practices, low socioeconomic status of majority of population and absence of sanitary latrine could be attributed as some of the factors. The symptoms of iron deficiency in adolescents include weakness and fatigue, dizziness, irritability, headache, tinnitus, shortness of breath, loss of appetite and decreased scholastic performance. The risk of anemia in adolescents not only affects their growth and function but also is a threat to their future health as risk of LBW preterm delivery, perinatal mortality and decreased work efficiency[3].

The Ministry of Health and Family Welfare has launched the Weekly Iron and Folic Acid Supplementation (WIFS) Programme in 2012 in India to combat the high prevalence and incidence of anemia among adolescents. WIFS is programme which was launched after many evidences obtained through different pilot studies to decrease preponderant anemia situation amongst adolescent girls and boys by supervised weekly ingestion of IFA supplementation and biannual helminthic control [4]. Weekly Iron Folic supplementation programme (WIFS) is being implemented from 3rd Dec 2013 in MP. The First state who has procured WIFS –Junior – IFA Pink (45mg) is Madhya Pradesh and supplementation of the same is being assured through AWCs and 85,113 Government Aided primary Schools [5].

Studies assessing impact of Weekly iron folic acid supplementation were done previously in other states but not identified Madhya Pradesh. So, this study was planned to assess impact of Weekly Iron Folic acid Supplementation programme (WIFS) amongst adolescents in selected government schools of Bhopal district.

2. METHODS

It is a Longitudinal community based study.

Study Area: Selected 4 Government schools of Bhopal

Study Population: Adolescents from selected 4 Government schools of Bhopal

Study Duration: 8 months (May 2019 t o Dec 2019)

Inclusion Criteria:

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

- 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 [6]. 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 X 15% i.e. 44.85 X 15/100 = 6.73)
So, n = 1.96 X 1.96 X 44.85 X 55.15 ÷ 6.73 X 6.73 = 209.8 ≈ 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.

3. METHODOLOGY

After obtaining clearance from the Institutional Ethical Committee, permission from District Education Officer of Bhopal (M.P.) was taken. Then list of all schools was obtained, out of which desired schools were selected as per requirement. Permission was also taken from the respective school's Principals. Later we visited the respective schools approached the eligible participants for the present study. After obtaining informed consent from participants and their parents, participants were then later interviewed using a Pre designed Pretested Semi structured questionnaire. Hemoglobin level was also estimated using a digital hemoglobinometer. Below are the cut of values to diagnose anemia at sea level (gm/dl) [12]

Adolescents	**Non-Anemia**	**Anemia**		
		Mild	**Moderate**	**Severe**
Children of 10-11 years of age	≥11.5	11.0-11.4	8.0-10.9	<8.0
Children of 12-14 years of age	≥12.0	10.0-10.9	8.0-10.9	<8.0
Girls aged 15-19 years	≥12.0	11.0-11.9	8.0-10.9	<8.0
Boys aged 15-19 years	≥13.0	11.0-12.9	8.0-10.9	<8.0

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

Follow up visit was done after 3 months of the first visit, to elicit the changes in hemoglobin level by measuring Hb level. We were able to study 257 adolescents as rest denied to participate.

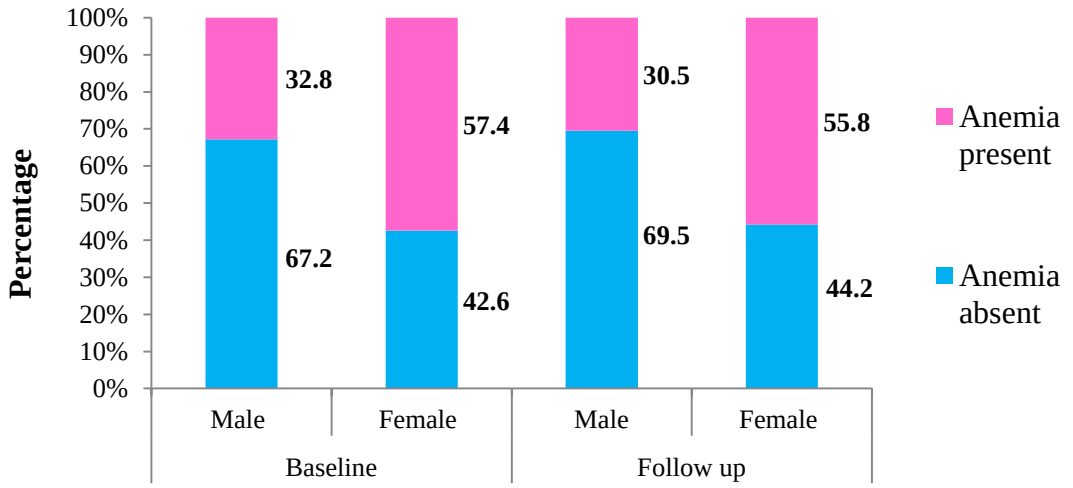
STATISTICAL ANALYSIS: Data was entered MS excel 2007, analysis was done with the help of Epi-Info 7 software. Frequency and percentage were calculated & statistical test (Chi Square and t- test) was applied wherever applicable; P value <0.05 was taken as statistically significant.

4. 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).**

Figure -1 Gender wise prevalence of anemia in adolescents at baseline and follow up visit

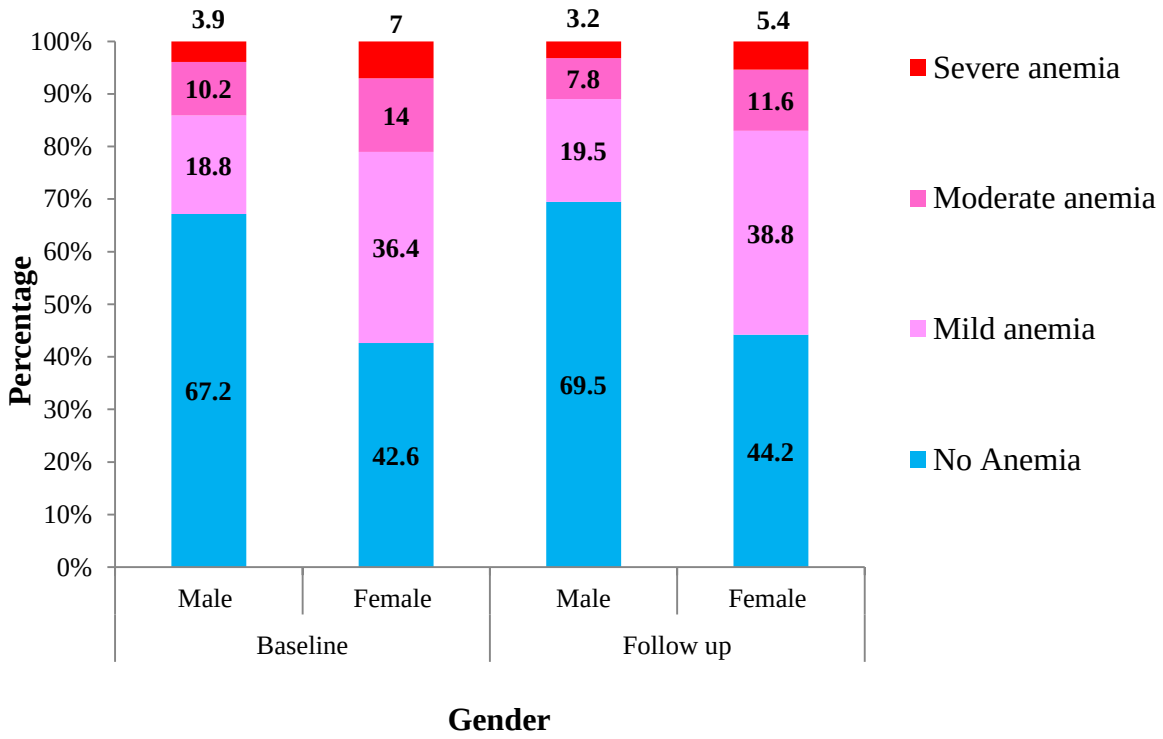


At baseline prevalence of mild anemia was 18.8% in males and 36.4% in females and that of moderate anemia was 10.2% in males and 14% in females and prevalence of severe anemia was 3.9% in males and 7% in females.

At follow up prevalence of mild anemia was 19.5% in males and 38.8% in females and that of moderate anemia was 7.8% in males and 11.6% in females and prevalence of severe anemia was 3.2% in males and 5.4% in females. (Fig - 2) These were found statistically significant **(p < 0.05).**

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

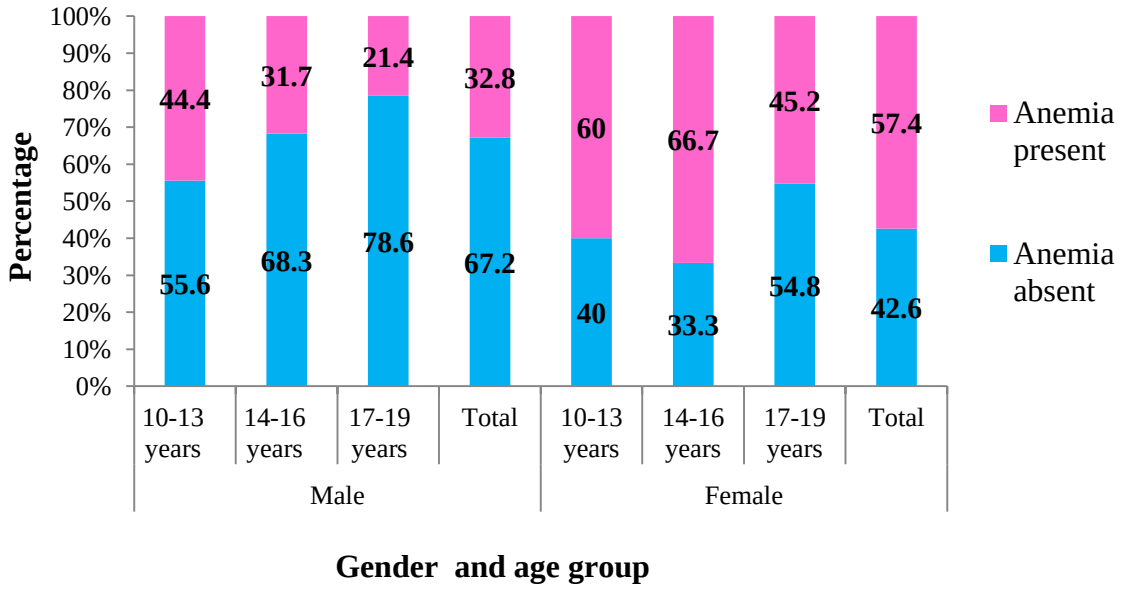
Figure - 2 Gender wise distribution of status of anemia in adolescents at baseline and follow up visit



At baseline age-wise distribution showed that the prevalence of anemia was more in early age group (10-13 years) 44.4% followed by middle adolescent boys (14-16 years) 31.7% and least in late adolescent boys (17-19 years) 21.4%, However in case of girls, prevalence of anemia was more in middle age group (66.7%) followed by early adolescent girls (60%) and late adolescent girls (57.4%) (Fig -3). These were found statistically significant **($p < 0.05$).**

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

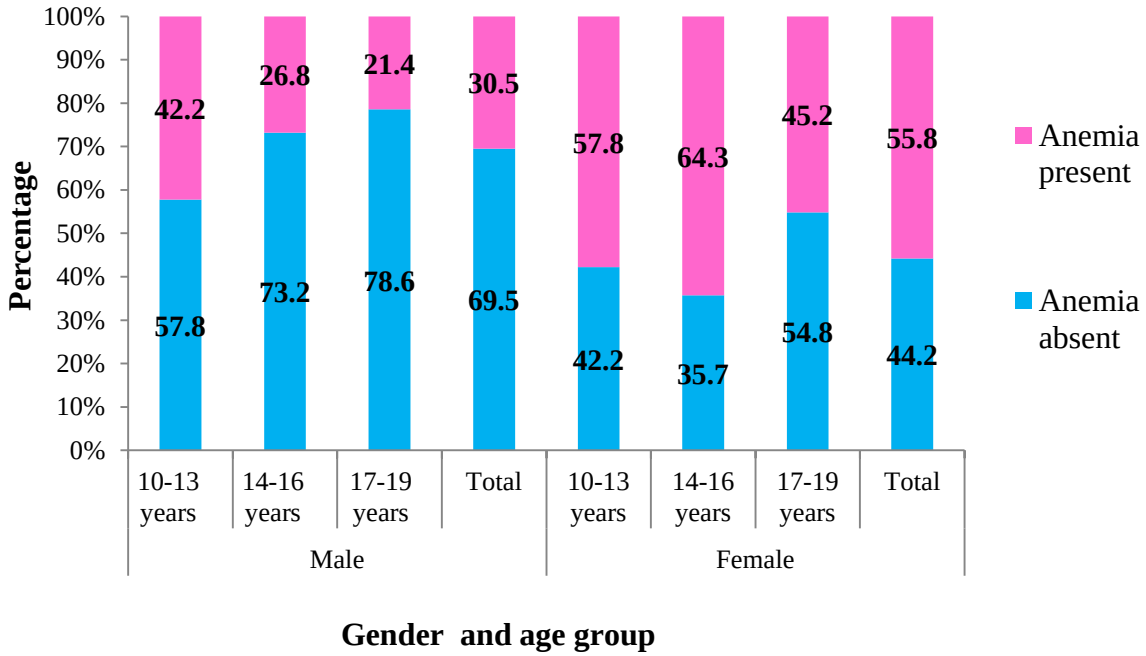
Figure - 3 Gender and age group wise prevalence of anemia in adolescents at base line



At follow up age-wise distribution showed that the prevalence of anemia was more in early 42.2% followed by middle adolescent boys 26.8% and least in late adolescent boys 21.4%, However in case of girls, prevalence of anemia was more in middle age group 64.3% followed by early adolescent girls 57.8% and late adolescent girls 45.2% (Fig -4). These were not found statistically significant ($p > 0.05$).

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

Figure - 4 Gender and age-group wise prevalence of anemia in adolescents at follow up visit



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 was7.3 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 ± 0.2407mg/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**	

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

5. DISCUSSION

In India the prevalence of anemia among adolescent girls is 54% and in boys 29% whereas in Madhya Pradesh it is 53.2% among adolescent girls and 36.5% in adolescent boys [6].

In the present study, 257 study participants were from ages 10-19 years. Among 257, there were 128(49.8%) males and 129 (50.2%) females.

In the present study among 128 boys and 129 girls 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. At baseline prevalence of mild, moderate and severe anemia among boys was 18.8%, 10.2% and 3.9% respectively. In case of girls prevalence of mild, moderate and severe anemia was 36.4%, 14% and 7% respectively. At follow up prevalence of mild anemia was 19.5% in males and 38.8% in females and that of moderate anemia was 7.8% in males and 11.6% in females and prevalence of severe anemia was 3.2% in males and 5.4% in females. These were found statistically significant ($p < 0.05$).

In a study conducted by Shobha P Shah et.al [7] (2013), reported that out of girls 117 and boys 127, 79.5% girls and 64% boys were anemic during baseline survey and post intervention prevalence was 58% among girls and 39% in boys. Here mild anemia among girls was 54.7% and boys 51.2%, moderate anemia in girls was 23% and in boys was 11.8% and severe anemia in girls was 1.7% and 0.8% in boys. Post intervention anemia was 58% among girls and 39% in boys, where mild anemia among girls was 51.3% and boys 33.9%, moderate anemia in girls was 5.9% and in boys was 4.7% and severe anemia in girls was 0.9% and no boys had severe anemia. There was significant reduction in anemia of all severity among adolescent girls and boys, similar to our study. In a study by Navinkumar Angadi et.al [8] (2013) found that in 174 girl participants the prevalence of anemia at the baseline was 38% and it reduced to 26% at the end of one year intervention. Here the proportion of mild, moderate and severe anemia was 32.5%, 4.5% and 1.1% respectively at baseline and after one year proportion of mild, moderate and severe anemia was 23%, 3% and 0% respectively. It was also found statistically significant as our study.

In the present study, at baseline age-wise distribution showed that the prevalence of anemia was more in early age group boys (10-13years) (44.4%) followed by middle adolescent boys (14-16years) (31.7%) and least in late adolescent boys (17-19) (21.4%), However in case of girls, prevalence of anemia was more in middle age group (66.7%) followed by early adolescent girls (60%) and late adolescent girls. At follow up age-wise distribution showed that the prevalence of anemia was more in early (42.2%) followed by middle adolescent boys (26.8%) and least in late adolescent boys (21.4%), However in case of girls, prevalence of anemia was more in middle age group (64.3%) followed by early adolescent girls (57.8%) and late adolescent girls (55.8%). These were not found statistically significant ($p > 0.05$).

In a study conducted by A. K. Arya et.al [9] (2015) reported that in Age-wise distribution the prevalence of anemia was more in middle (79.4%) and late adolescent girls (82.6%) compared to early adolescent girls (75.6%) but the association was not statistically significant, like our study. In a cross sectional study by T. Jain et.al [10] (2010) reported that in

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

Age-wise distribution the prevalence of anemia was more in late (48.8%) and early adolescent boys (44.5%) compared to middle adolescent boys (37.7%) but the difference between prevalence of anemia in different age groups was not found to be significant, similar to our study.

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 [7] (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 [11] (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 was1.5±0.1mg/dl.

4. CONCLUSION:

The period of school going children is period of rapid growth, when iron requirement for both girls and boys increases.The traditional diet in developing
countries, in which most iron is in non heme form, is not able to meet the high requirements for iron, resulting in a high prevalence of anemia.Weekly iron–folic acid supplementation combined with deworming every 6 months is a feasible and cost effective intervention for the prevention of anemia in adolescents in institutional settings. There is need of regular orientation to the teachers and anganwadi workers and nutrition education meetings for behaviour change communication to the parents. Periodic monitoring of the supplies, stocks and records of WIFS programme is needed. The importance of the IFA tablets and albendazole tablets in the prevention of iron deficiency anemia is needed to be educated by information, education and communication by social media also.

6. REFERENCES

1. WHO, UNICEF. Iron Deficiency Anaemia Assessment, Prevention, and Control A guide for programme managers. 2001. Available at: http://apps.who.int/iris/bitstream/10665/66914/1/WHO_NHD_01.3.pdf. Accessed on 05 May 2024.
2. WHO S-C-02. Prevention of iron deficiency anaemia in adolescents role of weekly iron and folic acid supplementation. Available at: http://apps.searo.who.int/PDS_DOCS/B4770.pdf?ua=1. Accessed on 05 May 2024.
3. Soman SK, Areekal B, Murali AJ, Varghese RG. Adolescent anaemia its prevalence and determinants: a cross-sectional study from south Kerala, India. Int J Community Med Public Health

ISSN: 0975-3583, 0976-2833 VOL14, ISSUE12, 2023

4. https://www.spring-nutrition.org/events/weekly-iron-and-folic-acid-supplementation-adolescents-india/Accessed on 05 May 2024.
5. http://www.nhmmp.gov.in/WIFS_Briefnote.aspx/Accessed on Sep 11 2020/Accessed on 05 May 2024.
6. Wilcox, W. (2015). Madhya Pradesh. State Politics in India, 127–174. https://doi.org/10.4135/9789353287832.n38
7. Shah, S. P., Shah, P., Desai, S., Modi, D., Desai, G., & Arora, H. (2016). 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 journal of community medicine : official publication of Indian Association of Preventive & Social Medicine, 41(2), 158–161. https://doi.org/10.4103/0970-0218.173498
8. Angadi N, Balu PS. Effectiveness of Weekly Iron and Folic Acid Supplementation Programme to Control Anemia among Rural Adolescent School Girls of Davangere, Karnataka. Natl J Community Med 2019;10(8):479-482
9. Arya AK, Lal P, Kumar N, Barman S. Prevalence of anemia among adolescent girls in an urban slum of Kanpur, Uttar Pradesh. Int J Med Sci Public Health 2017;6(9):1378-1381.
10. Jain, T., Chopra, H., Mohan, Y., & Rao, S. (2011). Prevalence of anemia and its relation to socio-demographic factors: Cross-sectional study among adolescent boys in urban Meerut, india. Biology and Medicine, 3(5), 1–5.
11. Bhoite, R. M., & Iyer, U. M. (2012). Sustainable effect of weekly iron Folic Acid Supplementation on growth and haemoglobin status of school children. Current Pediatric Research, 16(1), 77–82.
12. WHO, UNICEF, UNU. Iron deficiency anaemia: assessment, prevention and control, a guide for programme managers. Geneva, World Health Organization, 2001. Available athttp://www.who.int/nutrition/publications/micronutrients/anaemia_iron_deficiency/WHO_NHD_01.3/en/index.html)