Original Article

Knowledge, Attitude, and Practices Regarding Iron Folic Acid Tablets and Coverage of the Weekly Iron Folic Acid Supplementation Programme Among Rural Adolescent Girls in Nagpur District: A Cross-Sectional Study

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Abstract

Despite years of programmatic efforts, anemia among adolescent girls in India remains a significant public health challenge. This study aimed to assess awareness, practices related to iron and folic acid (IFA) tablet consumption, and coverage of the Weekly Iron and Folic Acid Supplementation (WIFS) program among adolescent girls in rural areas of Nagpur district, Maharashtra.

A cross-sectional design was employed to gather socio-demographic data and assess knowledge (five questions), attitude (three questions), and practices (nine questions) related to government-recommended IFA tablet consumption.

Among 221 randomly selected adolescent girls, 90.5% were aware of IFA tablets, primarily informed by school teachers. Over half knew the purpose of IFA supplementation. Although 94% reported having received IFA tablets in the past, only 88% consumed them. While most did not report adverse effects, one-third did not believe IFA consumption was beneficial. Common barriers to adherence included the bitter taste of the tablets, forgetfulness, and symptoms like nausea or vomiting. The recent coverage of WIFS was observed to be low. In 2017 and 2018 the program coverage was above 75% but dropped below 60% in other years. Only 9% of participants had received an IFA tablet in the past 14 days; of these, 60% consumed two tablets. The primary reason for non-consumption was non-receipt from schools (89%).

The study highlights inadequate knowledge of IFA benefits despite high awareness and suboptimal coverage of the WIFS program. Strengthening program delivery and addressing barriers to IFA consumption are essential to improve adherence and reduce anemia among adolescent girls in rural India.

Keywords: Adolescent, anaemia, Folic acid, Knowledge, India, Iron

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Introduction

Adolescents make up approximately one-fourth of India's population, and anemia has remained a serious health concern among this age group for several decades.[1] The rapid growth during adolescence, coupled with menstruation among girls, exacerbates the risk of anemia and may have far-reaching inter-generational consequences if not addressed in a timely manner.[2,3]Recognizing the critical importance of adolescence as a nutrition-sensitive phase, adolescents were included as the target group under the Weekly Iron Folic Acid Supplementation (WIFS) program in India since 2012. However, despite several years of program implementation, the reduction in the prevalence of anemia among adolescent girls has been limited.

In contrast, recent estimates from the National Family Health Survey (NFHS) indicate an increase in anemia prevalence among Indian adolescents aged 15-19 years, rising from 55.8% in 2005-2006 to 60.2% in 2019-2021 in rural areas.[4] This increase is a serious concern, particularly in light of the World Health Assembly's Global Nutrition Target, which aims for a 50% reduction in anemia in women aged 15-49 years and a 30% reduction in low birth weight by 2025.[5]

The persistently high prevalence of anemia in India may, in part, be attributed to the low uptake of iron-folic acid (IFA) tablets provided under the WIFS program among adolescent girls. The Indian NFHS data currently only covers IFA adherence for pregnant women.[6] Knowledge is a crucial and fundamental factor for changing attitudes and practices, which, in turn, can increase IFA consumption and contribute to anemia control. Health education interventions have proven effective in increasing the consumption of IFA tablets. For example, intensive health education among adolescent girls in Delhi not only boosted their IFA consumption but also improved their knowledge and practices.[7] Similarly, a study in Karnataka reported that educational interventions conducted by teachers were effective in increasing the demand for IFA and enhancing awareness and attitudes related to anemia and its prevention.[8] Therefore, assessing knowledge, attitudes, and practices (KAP) related to IFA tablets distributed under the WIFS programme among adolescent girls becomes crucial.

In efforts to control and prevent anemia, programmatic measures such as the supply of IFA, health education by teachers, biannual deworming, etc. need to align with the compliance to IFA among adolescent girls. A study from West Bengal revealed that 62% of adolescent girls did not receive IFA tablets in the previous month,[9]while another study from Uttarakhand reported that only 45% of adolescent girls had ever received IFA tablets.[10] Estimating the number of beneficiaries who receive and consume IFA, understanding their knowledge, attitudes, and practices (KAP) related to IFA, and ensuring the regular supply of IFA from schools are therefore critical elements in preventing and controlling anemia. This study aims to: 1) Assess the knowledge, attitudes, and practices regarding IFA tablets among adolescent girls, and 2) Evaluate the coverage of the WIFS program.

Methods

The present study is a part of an institutional-based cross-sectional observational study conducted from December 2019 to March 2020 among school going adolescent girls aged 14-19 years in rural areas of Nagpur district, where educational institutes received aid from the state government.

We recruited 221 apparently healthy rural adolescent girls through population-proportionate random sampling from 24 government schools across 18 villages served by four primary health centres. The subjects were chosen randomly using online random number generator program. Assuming the prevalence of anaemia among rural adolescent girls as 87%[11], precision of 5%, 95% confidence interval (CI) and 20% non-response rate the minimum required sample size was 214.A comprehensive description of the study methodology can be found elsewhere.[12]

Written informed consent were obtained from the participants. Trained researchers collected data using android tablets to capture information related to socio-demographics, KAP regarding IFA tablets. A pre-tested questionnaire developed with Epi-collect 5 was used.

The level of standard of living was assessed using a method described in NFHS-2.[13] A total of five

questions were used to assess knowledge about IFA tablets. Participants were shown a strip of IFA tablets to aid recognition. The knowledge-related questions explored the source of information about IFA tablets, the health conditions for which these tablets are recommended, and the perceived benefits of their consumption, using both structured and open-ended responses.

Attitudes toward IFA tablets were assessed through three questions, which explored whether the girls experienced any health issues following tablet consumption and their perceptions of the usefulness of IFA for their overall health. Additionally, detailed information was collected on the specific health issues reported after taking the tablets.

A total of nine questions were used to assess practices related to IFA tablet use. These included questions on the receipt and consumption of IFA tablets, the source from which the tablets were obtained, and reasons for non-consumption when applicable. Additional questions covered the receipt of IFA tablets over the past five years, receipt and consumption within the last 14 days, reasons for recent non-consumption, and the timing of tablet intake in relation to meals (before or after eating).

Ethical approval for the study was obtained from Institutional Review Board. Trial Registration Number: CTRI/2020/01/023035.dated 16/9/2019.

Data analysis

Data collected from the multiple android tablets were synced to the server, downloaded and exported to Microsoft excel. This excel file then exported into Epi-Info version 7.2.5.0 for further analysis. The analysis includes girls who consented to give blood for estimation. In all 221 girls had data on hemoglobin and data regarding KAP variables. We present results as frequencies and percentages.

Results

The sociodemographic characteristics of the study population are summarized in Table 1.

Table 1: General characteristics of the population by anemia status

		Anemia proportion
Variables	N (%)	n (%)
Age (years)		
14-17	185 (84)	105 (56.7)
18-19	36 (16)	22 (61.1)
SLI Index		
Low-Medium	21 (9.5)	10 (47.6)
High	200 (90.5)	117 (58.5)
Family Type		
Nuclear	129 (58.4)	66 (51.6)
Non-nuclear	92 (41.6)	61 (66.3)
Family size		
< 4	16 (7)	8 (50)
≥ 4	205 (93)	119 (58.1)
Mother's education		
Literate	188 (85.1)	107 (56.9)
Illiterate/ Don't know	33 (14.9)	20 (60.6)
Father's education		
Literate	186 (84.2)	103 (55.4)
Illiterate/ Don't know	35 (15.8)	24 (68.6)

A significant proportion of the girls (84%) belonged to the younger age group and were associated with a high standard of living index (90.5%). Approximately 54% of the girls resided in nuclear family setups, and 93% had family sizes exceeding four members. The majority of these girls had literate parents, with 85% of mothers and 84% of fathers being literate.

Knowledge regarding IFA tablets among adolescent girls is presented in Table 2. The majority of girls (90.5%) could correctly identify IFA tablets. Among those who recognized the tablets, 97% received information about them from their teachers, while the remainder received information from sources like the Primary Health Center (PHC), Accredited Social Health Activist (ASHA), or Anganwadi Worker (AWW). Approximately 56% of the girls accurately answered the purpose for which IFA tablets are prescribed. In terms of structured responses regarding the benefits of IFA tablets, 32.3% mentioned improved strength, 20% believed IFA tablets reduce weakness, 14% associated them with increased intelligence, and 8% pointed to a cheerful and active feeling as advantages. One-fourth of the girls (25.7%) mentioned

additional benefits, with 43.6% emphasizing increased blood, hemoglobin, or iron, 16% attributing it to increased appetite or growth, nearly 10% reporting feeling lighter, better, or nicer, and 6.5% finding IFA beneficial in regularizing menstrual cycles. A smaller percentage (less than 2%) mentioned effects like killing germs, reducing palpitations, or diminishing dark circles under the eyes. Only 3% expressed a neutral view or reported no benefits.

Table 2: Knowledge towards IFA tablet among study population

Knowledge related questions	N (%)
Do you know about iron folic acid (IFA) tablets?	
Yes	200 (90.5)
No	20 (9)
Do not know	1 (0.5)
From which source did you happen to know about these tablets?	
Teachers	194 (97)
PHC/ ASHA /AWW	6 (3)
For which of the following condition these IFA tablets are given?	
Having knowledge of anemia	123 (56)
No knowledge of anemia	98 (44)
What are the benefits of IFA tablets according to you (Multiple responses)	
Gives strength	69 (32.3)
Decrease weakness	42 (19.6)
Feel cheerful and active	18 (8.4)
Improves intelligence	30 (14)
Any other	55 (25.7)
Reported other benefits of IFA tablet consumption (Multiple responses)	
Increased appetite or increases weight	10 (16.1)
Keeps body fit or helps in growth	10 (16.1)
Increases blood, hemoglobin or iron	27 (43.6)
Feel better, nice, lighter	6 (9.7)
Reduces palpitation	1 (1.6)
Helps to regularize menstrual cycle	4 (6.5)
Kills germs	1 (1.6)
Reduces dark circles under eyes	1 (1.6)
No benefits or cannot say	2 (3.2)

Table 3 summarizes attitudes toward IFA tablets. Only 8% of girls reported adverse effects after consumption, with nausea being most prevalent (61%). Other symptoms included isolated stomach pain (22%), concurrent nausea and stomach pain (11%), and stomach pain with black stool (5.5%). While 59.3% of girls perceived health benefits from IFA consumption, nearly one-third (29.8%) reported no perceived benefits.

Table 3: Positive or negative attitude towards IFA tablets among study population

Positive or negative attitude towards IFA	Frequency (%)
Did you experience any health problems after consumption of IFA tablets	
Yes	18 (8.2)
No	187 (84.6)
Don't Know	16 (7.2)
Responses for health issues associated with IFA tablets consumption	
Stomach pain	4 (22.2)
Feeling of nausea	11 (61.1)
Stomach pain and nausea	2 (11.1)
Stomach pain and black stool	1 (5.5)
Do you find the consumption of IFA tablets has benefited your health	
Yes	131 (59.3)
No	66 (29.8)
Don't Know	24 (10.9)

Table 4 presents recent IFA consumption practices. Among surveyed girls, 94% reported ever receiving IFA tablets, and 88% reported consuming them. A significant portion (over 50%) of the girls complained about the bitter taste of the tablets, which was a common reason for non-consumption. Approximately 19% of the girls mentioned feeling nausea, vomiting, or a burning sensation as reasons for not taking the tablets. Forgetfulness, family prohibition, and lack of awareness about IFA were cited as reasons by the remaining one-fourth of the girls. The educational institute, primarily the school or college, served as the source for the majority of these girls (97%) to receive the tablets, while others obtained

them from sources like the PHC, ASHA, AWW, or private health facilities. In 2019 and 2015, fewer than 50% of the girls reported receiving the tablets, while over three-fourths of the girls mentioned receiving tablets in 2018 (82.5%) and 2017 (77.2%). In 2016, only 60% of the girls received the tablets. Approximately 7% of the girls claimed they never received the tablets. Among the total, fewer than 10% of the girls mentioned that they have consumed tablets in the last 14 days. Of those who did, 35% consumed one tablet, 60% reported consuming two tablets, and 5% mentioned consuming three tablets in the past 14 days. The majority of these girls (90%) reported taking the tablets after their meals. More than 90% of the girls did not consume tablets in the past 14 days, primarily due to not receiving the tablets from their school (89%). Other reasons included absenteeism (6%), lack of awareness (2%), dislike (1.5%), forgetfulness (1%), and family prohibition (0.5%).

Table 4: IFA tablet receipt, consumption, and recent adherence practices

Practice related questions	**Frequency (%)**
Have you ever received IFA tablets?	
Yes	208 (94)
No	13 (6)
Did you consume the tablets which you receive last time?	
Yes	195 (88)
No	16 (7)
Don't know	10 (5)
What was reason for not consuming tablets received last time ?	
Bad or bitter taste, do not like	9 (56.3)
Feeling of nausea or vomiting or burning sensation	3 (18.8)
Prohibition from family	1 (6.2)
Forgot	2 (12.5)
Unaware of IFA tablets	1 (6.2)
From where did you receive IFA tablets last time ?	
School/College	202 (97)
PHC	2 (1)
Private health facility	1 (0.5)
ASHA	1 (0.5)
AWW	2 (1)
In which of the following years you regularly (means once a week) received IFA tablets ? (Multiple responses)	
2019	88 (49.2)
2018	170 (82.5)
2017	159 (77.2)
2016	122 (59.5)
2015	84 (44.2)
Never received in 2015-2019	15 (6.8)
Have you consumed any IFA tablets within the last 14 days?	
Yes	20 (9)
No	201 (91)
How many IFA tablets have you consumed in the last 14 days	
One tablet	7 (35)
Two tablets	12 (60)
Three tablets	1 (5)
When did you consume these tablets?	
Before meals	2 (10)
After meals	18 (90)
What was the reason for not consuming tablets in last 14 days	
Did not receive	179 (89.1)
Do not like	3 (1.5)
Absent	12 (5.9)
Forgot	2 (1.0)
Unaware	4 (2)
Family prohibition	1 (0.5)

Discussion

In this institutional based cross sectional study we sought to investigate the knowledge, attitude and practices regarding IFA tablets, reasons for not consuming IFA, coverage of WIFS among rural adolescent girls in Nagpur district.

We assessed the knowledge regarding IFA tablets by showing the girls a strip of IFA tablets. The results indicated that the majority of the girls (90.5%) in our study were aware of IFA tablets. However,

despite this awareness, only 56% of the girls knew the purpose of IFA tablets. Notably, recent studies conducted in other parts of India have reported similarly poor knowledge aboutanemia among adolescent girls.[14,15] It's worth mentioning that these studies were conducted in urban areas.

Responses regarding the benefits of IFA tablets, such as increased strength, reduced weakness, and improved intelligence, were reported by fewer than 35% of the girls. Additionally, less than 45% of the girls mentioned benefits related to increased blood, hemoglobin, or iron levels. A study conducted in Ahmedabad district found that 47.4% of the girls were unaware of the positive effects of IFA tablets on their health.[16] Another recent study, conducted via social media platforms like Facebook, also reported a lower level of knowledge among younger women.[17] The situation is paradoxical; while we witness a significant increase in the use of social media platforms for various purposes, its potential for promoting health awareness remains largely untapped.

While the majority of girls (97%) reported that they learned about IFA tablets from their teachers, the poor understanding of the tablets' purpose and benefits among adolescent girls is likely attributed to a deficiency in health education efforts by teachers. This suggests that school teachers may be overlooking a crucial opportunity to enhance students' knowledge, attitudes, and practices related to the role of IFA tablets in preventing anemia. A qualitative study from rural Karnatak from 64 in-depth interviews of adolescent girls and six focus group discussion revealed that the girls had very low awareness of anemia and school-based distribution of iron and folic acid supplements and nutrition talks were not seen to be resulting in knowledge and acceptance of the importance of preventing anemia.[18]

Consistent with low perceived health benefits (30%), 8% reported gastrointestinal adverse effects despite 85% overall tolerability. According to guidelines, IFA tablets should be taken after a meal. It's highly likely that some of the girls are taking these tablets on an empty stomach. Addressing these issues can be achieved if teachers ensure that students have eaten before distributing the tablets in class. This can be best accomplished by distributing the tablets in class immediately after the lunch break in accordance with the National Health Mission's guidelines. These health problems related to IFA consumption may explain why one-third of the girls in our study do not perceive IFA consumption as beneficial for their health.

Adherence to the recommended treatment regimen within the target population is essential for the success of any health program. While 94% of girls reported recent receipt of IFA tablets, only 88% consumed them. Among the 16 non-consumers, bitter taste was the predominant barrier (56%, n=9), followed by forgetfulness or nausea/vomiting. These findings align with existing literature. Bhatt and Mehta (2013) reported 66% discontinuation due to gastrointestinal issues in Gujarat[16] while a study by Sajna et al in Thrissur Corporation found side effects limited adherence to just 15%.[19] Compliance with IFA tablets has remained a significant challenge in the success of the WIFS program in India.

Our study revealed that, in the past 14 days, 40% of the girls did not adhere to the recommended dose of one tablet per week, and 10% of the girls consumed it before meals, contrary to the recommendations. Such unsupervised tablet consumption practices among girls are detrimental to the success of the WIFS program.

Teachers play a critical role in the implementation of the WIFS program for school adolescents, as it involves the coordination of education and the health department. The role of parents in supporting the girls should not be underestimated. Policy planners have recognized the importance of involving parents and have advocated for their orientation on WIFS and nutritional health education during parent-teacher association meetings. Motivation from parents and health education from teachers have been documented as motivating factors for IFA consumption.[20,21] Regular counselling and health education from teachers, with support and cooperation from parents, can enhance adherence and compliance with IFA and generate demand for IFA among the target population.

Enhancing adherence or compliance to IFA is closely tied to its coverage. In our study, the coverage of WIFS in 2018 and 2017 exceeded 75%, while in

other years, it fell below 60%. Additionally, over 90% of the adolescent girls in our study did not consume the tablet in the last 14 days because the majority of them did not receive it. The current evidence of low IFA coverage, coupled with findings from various regions in India raises concerns about WIFS implementation.[9,22,23]

The recent insufficient coverage of IFA among adolescents could be attributed to the lack of coordination between the health and education departments.[24] Furthermore, these findings underscore the importance of managing the components of the IFA supply. Ahmad et al. [25] in their study assessing the IFA supply chain in 58 districts, 116 blocks, 232 sub-centers, 232 schools, and 232 anganwadis in India, identified key issues, such as the absence of a standardized forecasting process, lack of inventory management techniques, the absence of a fixed distribution schedule, inadequate availability of transport vehicles, and the absence of an integrated management information system. Regular sensitization and training workshops for school staff have proven effective in increasing IFA coverage.[24] Low IFA coverage can have a significant impact on adolescent girls, given their higher nutritional requirements during adolescence. This deficiency can lead to anemia, potentially affecting their future reproductive health.[26]

While there are numerous studies addressing KAP related to anemia, to the best of our knowledge, this is the first study to explore KAP and the coverage of IFA tablets in Nagpur district. A study from an adjacent district has examined the supply side of WIFS implementation among adolescents using mixed methods.[27] In contrast, our study emphasizes the demand side of WIFS and addresses a crucial gap that requires attention in the WIFS implementation.

Our study findings are specific to school-going adolescent girls in rural areas. Compliance with IFA tablet consumption was assessed through self-reported data, which may be subject to recall bias, particularly regarding tablet receipt over the past fourteen days or in previous years. Additionally, the study did not include the supply-side perspective—that of key stakeholders such as school principals, block education officers, parents of children and health officials at primary health centres and sub-centres. These perspectives are essential for a comprehensive understanding of program implementation and should not be overlooked in future research.

Conclusion

Our study addresses the gaps in understanding the knowledge, attitudes, practices, and coverage of IFA tablets among rural adolescent girls in Nagpur district. We found that awareness regarding IFA tablets was limited. The discouraging factors, such as feelings of nausea and vomiting associated with IFA consumption among adolescent girls, can be mitigated through supervised ingestion of the tablets after ensuring that the girls have had their meals. Moreover, involving parents in the program can provide support and motivation to augment IFA consumption among adolescent girls, ultimately increasing the demand for IFA. The low coverage of IFA emerged as a major reason for non-consumption of IFA in the past 14 days. A key limitation of our study is that we did not assess the supply side of IFA tablets, which would have provided a more comprehensive understanding of the WIFS program implementation in rural Nagpur district, Maharashtra.

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