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Original Research Article

Adherence and barriers of prophylactic iron and folic acid supplementation in children: a community-based mixed method study

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ABSTRACT

Background: Anemia is a public health challenge in India among children, adolescents and reproductive age women. Still, 58% of under-five children in India and 43% in Puducherry are anaemic. To determine the proportion of mothers of one-to-nine-year children, aware about iron and folic acid (IFA) supplementation, the proportion of children adherent to the dosage of IFA and the barriers for the adherence to IFA.
Methods: A community-based explanatory sequential mixed methods study consisting survey using a semi-structured questionnaire and followed by focus group discussions (FGD) using an interview guide. The data was collected using EpiCollect5 analysed using SPSS. The results were expressed as proportions with 95% confidence interval (CI) and the qualitative results were expressed as a conceptual framework.
Results: Awareness about IFA supplementation given to children from the public health system was 57% (95% CI: 51.8-62.0) among mothers of one-to-nine-year children. Adherence to IFA supplementation was 34% (28.9.0-38.6). The main reason of the non-adherence reported by the mothers was non-availability of the supplements, nausea and vomiting among children and forgetfulness of the mother. In the FGD, supply side reasons were non-palatability and wrong dose administration, and demand side reasons were lack of awareness and coverage.
Conclusions: Only one out of ten children among under five years were taking IFA syrup and only half of the children ages five-to-nine-years consumed IFA tablets given in their schools. Irregular distribution of IFA tablets, medication side-effects, and non-palatability of the medication were the main reasons quoted by the mother for non-adherence.

Keywords: Adherence, Barriers, Iron deficiency anemia, IFA-iron and folic acid supplement, Prophylactic

INTRODUCTION

Anemia is a public health challenge in India particularly among children, adolescents and women in the reproductive age. It affects quality of life by affecting the physical health and mental wellbeing. It can lead to significant morbidities and mortalities in the affected population and subsequent socio-economic loss for the country. Due to anemia the economic costs for loss of productivity was US dollar 2.32 per capita, which is 0.57% of gross domestic product of low and middle-income countries.[1]

In 2021, World Health Organization reported 269 million children were having anemia. The highest burden was found in the region of Africa about 48% among 6 to 59 months year children.[2]

Comprehensive National Nutrition Survey reports about 41% of children aged 1-4 years, 24% of children 5-9 years and 28% of children 10-19 years showed some degree of anemia. The severity of anemia varied across different age groups of school-age children.[3]

Among the causes of anemia, iron deficiency is one of the most common reasons. Iron is a mineral, essential for carrying oxygen in haemoglobin in the red blood cells, and intake or absorption of inadequate dietary iron, enhanced requirement in children the period of growth or when there is intestinal helminths infection such as schistosomiasis and hookworm infestation there is chances of iron deficiency.[4] Children having anemia are prone for delayed psychomotor development well as poor physical and mental performance. They also tend to get poor language coordination and as well as poor motor skills.[5]

In India, bi-weekly schedule of iron and folic acid (IFA) supplementation has to be given for children (6-59 months).[6] In Government/Government aided schools, IFA supplementation has to be given for children (class I to class V) and adolescents (Class VI to XII).[7,8]

As per National Family Health Survey - 4 (NFHS-4) report the anemia prevalence in under five children is more than (58%) in India as a whole and 43.8% in Puducherry. And there is less data available for the age group five to nine regarding the status of IFA supplementation compliance and barriers.[9] Hence, this study was conducted to assess the awareness on Anemia and IFA supplementation among the mothers, and the adherence and reasons for non-adherence to the supplements in children.

METHODS

A community-based explanatory sequential mixed methods study, consisting of semi-structured pre-tested questionnaire-based survey and focus group discussion was conducted in the selected urban and rural service areas of tertiary care centre in Puducherry from September to October 2019. Mothers of one to nine years children were interviewed. Those children who did not stay with the mother for more than six months and children with acute severe malnutrition and thalassemia major who were contraindicated for prophylactic IFA as per National Iron plus Initiative (NIPI) guideline were excluded.

Assuming the proportion of children who adhered to IFA supplement to be 50% with alpha error of 5% and at 95% confidence level, the sample size was calculated to be 384 in OpenEpi v3.0 software.

The study participants were selected using proportionate sampling based on the population size in rural and urban area as per Census 2011 and based on the population size of one to less than five year and five to nine-year children residing in respective areas. As per NIPI guideline, adherence was considered to be consumption of at least 8 doses of biweekly IFA per month by one to less than five years and at least 4 tablets of weekly IFA per month by five to nine-years, in the last three months.

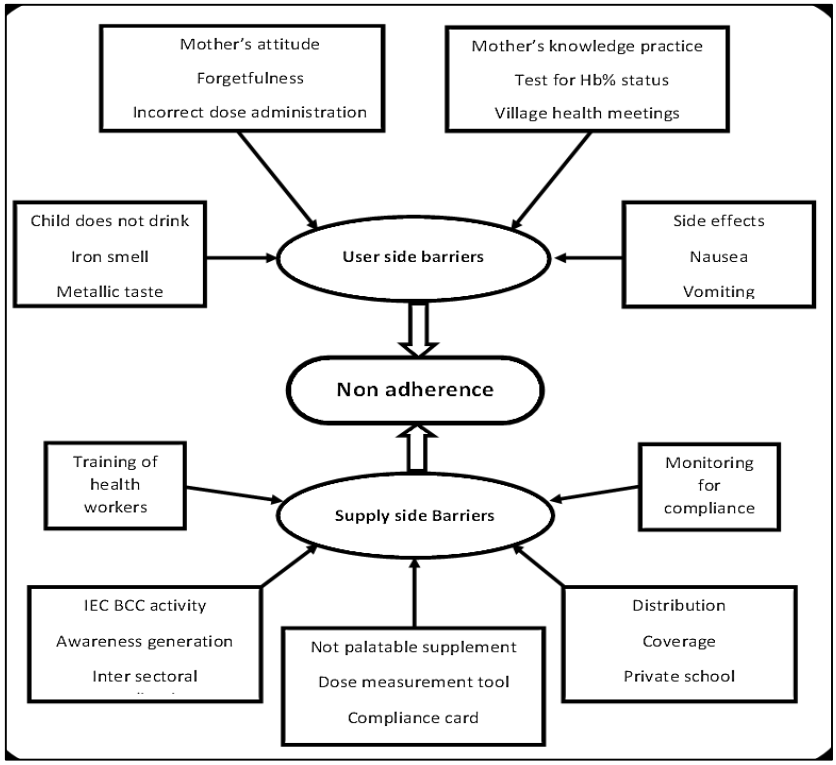

Figure 1: Conceptual framework of Barriers of adherence of IFA supplement in one to nine-year children.

After obtaining approval from Institute Ethics and Scientific committee, the study was initiated. Well before the data collection, the mothers were given detailed explanation about the study and written consent was obtained. Pretesting of the questionnaire was done among twenty respondent mothers to prepare Tamil and English bilingual semi-structured questionnaire. The data were collected with the help of Epicollect5 software and analysed using SPSS version 22. The awareness, reasons for adherence and non-adherence was expressed as proportion with 95% confidence interval (CI).

After the survey was done to understand the barriers of IFA supplement, an interview guide was prepared to facilitate focus group discussions. The mothers were contacted over phone or were contacted during their field visits by the workers for consenting to the focus group discussion. Two focus group discussion were conducted among six participants with a moderator, an interviewer, and a record keeper both in urban and rural service areas. The interview was conducted by the principal investigator and, written and recorded by public health trainees after due consent from the participants. The transcript was prepared from the audio recording and was translated to English. The qualitative data was analysed by manual content analysis and both inductive and deductive coding was done. From the codes themes and concepts were made manually and the result was explained by a conceptual framework.

RESULTS

In this study, 363 mothers-child pair were recruited. Their children's mean (SD) age was 4.9 (2.3) years. Out of them 48.4% were boys and 64.1% were staying in urban area of Puducherry. One to less than five years children were 44.9% and five to nine years were 55.1%. Among the recruited children nearly 56.7% were first order by birth. Nearly 27.6% children were in home during day time and 71.6 were in school. Majority of the children (96.5%) were used to mixed food habit. (Table 1).

Among the mothers interviewed 57% (95% CI: 51.8-62.0) were aware that IFA supplement was given from the Government health system for children. This proportion was higher among mothers of five to nine-year children than one to less than five-year children (61.5% vs 51.5%). Awareness about the colour of the IFA supplement tablet and correct dose was 47.3% and 26.1%. And this proportion was higher among mothers of five to nine-year children than one to less than five-year children. The awareness on IFA supplement being taken in pregnancy was maximum, 93.1%. the awareness that anemia is a common clinical problem in children was minimum, 3.3%. (Table 2).

About 33.6% (28.9-38.6%) of the children were found to be compliant to the IFA dosage as per NIPI programme. This proportion was much higher among mothers of five to nine-year children than one to less than five-year children (54% vs 9%). As a part of the NIPI program 89.2% (85.6-92.0%) of the children under the study were found to have consumed Albendazole in the last six months. Unlike IFA compliance, compliance to albendazole was similar among one to less than five-year children and five to nine-year children (89.5% vs 89.4%). (Table 3).

Table 1: Sociodemographic characteristics of the one-to-nine-year children residing in selected urban and rural areas of Puducherry, N=363.

Characteristics	Frequency	Percentage
Gender		
Boy	176	48.4
Girl	187	51.5
Residence		
Urban	233	64.1
Rural	130	35.9
Age category (in years)		
one to less than five	163	44.9
Five to nine	200	55.1
Birth order		
First	206	56.7
Second	141	38.8
Third or more	15	4.1
Day time stay		
Home	100	27.6
School	260	71.6
Day care	3	0.8
Food habit		
Vegetarian	13	3.5
Non vegetarian	350	96.5

The main reason for not adhering to the supplement as reported by mothers of one to less than five-year children was that they didn't receive the IFA syrup supplements. Other reasons were side effects like vomiting, received for less than what they required and shortage of stock. Minor reasons were mother's decision of not giving and forgetfulness. Majority of mothers of five to nine-year children reported that they didn't receive the IFA syrup supplements. Few others told some stopped taking because of side effects like vomiting and stomach-ache. (Table 4). The factors of the focus group discussion were classified into demand side and supply side. The children did not drink the syrup because of its metallic taste and iron smell. The non-adherence to the dosage was found to be because of side effects like nausea and vomiting. On the mother's part the non-adherence was because of wrong dose administration and their forgetfulness. The other barriers from the supply side were lack of awareness to be generated on childhood anemia and its health outcomes, inadequacy on distribution and coverage system, insufficiency of trained staffs, lack of proper monitoring system, non-availability of the compliance card and lack of measuring tool for proper dosage. (Figure 1).

Table 2: Awareness status on IFA supplement among mothers of one-to-nine-year children residing in selected urban and rural areas of Puducherry, N=363.

Awareness on	Total, N=363			One to five-year children, n=163			Five to nine-year children, n=200		
	N, % (95% CI)			N, % (95% CI)			N, % (95% CI)		
IFA being supplied from the Govt. Health system for the children	207	57.0	(51.8-62.0)	84	51.5	(43.9-59.0)	123	61.5	(54.6-67.9)
Appropriate Color of the supplement	172	47.3	(42.3-52.5)	72	44.1	(36.7-51.8)	100	50.0	(43.1-56.8)
Correct dose of the supplement	95	26.1	(22.1-31.2)	19	11.6	(7.5-17.4)	76	38.0	(31.5-44.8)
Anemia is a common clinical problem in children	12	3.3	(1.9-5.6)	6	3.6	(1.7-7.7)	6	3.0	(1.3-6.1)
IFA supplement being taken in pregnancy	338	93.1	(90.0-95.2)	143	87.7	(81.8-91.9)	195	97.5	(94.2-98.9)

Table 3: Adherence of the prophylactic IFA supplementation among children aged (1-9) years residing in selected urban and rural areas of Puducherry, N=363.

Variable	Total, N=363			Under five-year children†, n=163			Five to nine-year children‡, n=200		
	N, % (95% CI)			N, % (95% CI)			N, % (95% CI)		
Adherence to the IFA dosage	122	33.6	(28.9-38.6)	15	9.2	(5.6-14.6)	107	53.5	(46.5-60.2)
Less than adherence#	45	12.3	(9.3-16.1)	32	19.6	(14.2-26.4)	13	6.5	(3.8-10.8)
Bi annual Albendazole	324	89.2	(85.6-92.0)	146	89.5	(83.9-93.3)	178	89.4	(83.9-92.6)

†Adherence in 1 to < 5 year = 8 dosage per month in last three months**;** ‡5-9 year =4 tablets per month in last three months; #Less adherence children who were taking IFA supplement but not the scheduled dosage.

Table 4: Reasons for not taking the IFA supplementation among children aged (1-9) years residing in selected urban and rural areas of Puducherry, N=363.

Children by age category	n, % (95% CI)		
In one to less than five -years children, n=116			
Not received	50	43.3	(34.4-52.1)
Stopped due to vomiting	18	15.5	(10.0-23.2)
Mother decided not to give	7	6.0	(2.9-11.9)
Mother forgot	7	6.0	(2.9-11.9)
Received for less than one month	16	13.7	(8.6-21.2)
Stock finished three months back	18	15.5	(10.0-23.2)
In five to nine -year children, n=80			
Not received* (Private school)	72	90.0	(81.4-94.8)
Stopped due to vomiting and stomach pain	8	10.0	(5.1-18.5)

*Children going to private schools were not given IFA supplement in the study period.

DISCUSSION

This study was conducted in selected urban and rural areas of Puducherry to assess the awareness regarding IFA supplement its usage, adherence and barriers among one to nine-year children from their mothers. In our study, only half of the mothers were aware that IFA supplement was given from the Government health system for the children. Similarly, awareness about the colour of the supplement was there among half of the mothers and aware about the correct dose was there only among one-fourth of the mothers. Almost none were aware that anemia was a common pathological condition in children. The overall adherence of IFA supplement was

there among only one-third of the mothers even though the awareness of taking IFA supplements during pregnancy was nearly 90%. But the adherence towards the albendazole tablets were among nine out of ten mothers.[8]

The knowledge among mothers on child anemia was 35.8% to 36.9% had knowledge about one symptom of anemia respectively, and maternal knowledge was associated with lower odds of anemia in children.[10] As our study showed lower awareness of mothers on anemia further awareness generation programs should be planned in the community related to anemia in young children.

Children might never receive any supplement because the doctor had never prescribed it leading to very low coverage of iron supplement among children. Only half of the children would have received iron supplement at least once in their life time.[11] Maternal knowledge and socioeconomic status was associated with prevalence of anemia and adherence of iron supplement.[12,13] Studies have shown that knowledge of mothers about anemia in children showed 29% mothers knew about anemia from health workers and 8% from media.[14] In our study the awareness on anemia in children among mothers was only 3%. The mothers got the information from the health workers or Anganwadi workers. So, awareness generation programs and behaviour change communication programs can be enhanced for better awareness and demand generation.

The adherence was more when the iron supplements were delivered directly by a health worker and the adherence was more.[15] So, the IFA supplement in our setting also can be enhanced by giving it in direct supervision of health workers. The main cause of noncompliance was fear of any harm, any unpleasant side effects or past experience of any side effects.[16]

In our study, one of the reasons for not taking the supplement was inadequacy in the stocks of IFA especially among five-to-nine-year children. Children of one to less than five-year were not taking the iron supplement because of nausea and vomiting, and either mother forgot to give or decided not to give. Few reported of non-adherence because of late receipt of the stock or stock out of the supplement. The results were in line with other studies.

Sequential focus group discussion among mothers of non-adherent children showed that they received the syrup either from the health worker or whenever they came to the hospital for immunization. One of the main barriers for taking the IFA syrup was non-palatability of the syrup and side effects like nausea and vomiting as told by the mothers in the focus group discussion.[17]

As we interviewed the mother of the child in five to nine year of age it was difficult to extract the exact adherence and barriers for the IFA tablet because the children in this age group take the supplement in school under supervision of the teachers. In future we will suggest conducting studies in school for the above age group for better information.

As there are very few studies found in India among the children for adherence and barriers of prophylactic iron and folic acid supplement in children, this study will add to existing literature and help in further research. Social desirability bias and recall bias might be there for reporting the adherence of the dosage, as there were no records to cross check the facts.

CONCLUSION

In this study it was found that only one in ten children in one to five year and one in two children in five to ten years were adherent to the IFA dosage. The main reason for non-adherence were non-availability of the supplement and side effects like nausea and vomiting due to non-palatability. For better adherence of the supplement, it is recommended to increase the awareness programs on anemia and its consequences so that the demand generation will be there. Our study recommends the government and health system to take necessary action for the better palatability of the IFA syrup and training of the healthcare staffs for better coverage.

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