Original Article

Coverage evaluation of Iron folic acid and vitamin A supplementation among children in rural Puducherry—A Mixed method study

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Abstract

Background: Despite many measures taken by the government, still the problem of Vitamin A deficiency and anaemia exists among children. This study focuses on coverage of iron and folic acid and Vitamin A supplementation among children aged between 9 months and 5 years and to find out the barriers in administrating these supplements to children. **Methods:** An explanatory sequential mixed methodology was conducted in the field practice area of Thirubuvanai primary health centre. In the quantitative survey, a cross-sectional cluster sampling survey was conducted to find the coverage of IFA and Vitamin A supplementation among children ($n = 215$), followed by a qualitative interview ($n = 14$) to find out the barriers in administrating these supplements to children was conducted among the mothers. **Results:** Our study found that Vitamin A supplementation coverage was taken only by 42% of the children in the last 6 months preceding the survey. IFA supplementation was taken by 31.2% of the children in the last 7 days preceding the survey. Lack of awareness, myths and misbeliefs, fear of adverse effects and lack of family support were found as barriers in administering the supplement to the children. **Conclusion:** The study findings have highlighted the need for community health education to improve the coverage of supplement administration.

Keywords: Coverage evaluation, iron and FA supplementation, Vitamin A supplementation

Introduction

Worldwide, almost 30% of children aged less than 5 years were estimated to be Vitamin A deficient.[1] Childhood Vitamin A deficiency has been recognized as a major public health problem in most of the countries like India.[2] Vitamin A deficiency (VAD) in children has been linked to increased risk of diseases including diarrhoea, measles, vision problems, respiratory diseases and even death.[3] VAD is also one of the leading causes of preventable blindness in children below 5 years. Children who do not have enough Vitamin A in their body have very limited resistance for infections due to which they are easily prone for all the infections and increased risk of vision damage. An estimate of about 17 trials showed that Vitamin A supplementation reduces all-cause of mortality by 24% among children of 6 to 59 months.[4] A meta-analysis of 19 trials including almost 1.2 million children showed that Vitamin A supplementation was linked with a 12% reduction in risk of over all-cause of mortality in children.[4]

Government of India recommends that all children should receive the first dose of Vitamin A along with the measles vaccine followed by a subsequent dose once in every 6 months. A total of nine doses of Vitamin A should be administered to children before five years of age. Studies have reported that consistent coverage of more than 80% is required to achieve mortality reduction as demonstrated in efficacy studies.[5] Iron and folic acid are necessary for the adequate growth and development of the child. Iron

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deficiency is due to the increased requirement of iron during the growth of the child.[6] A high prevalence of anaemia has been reported among all vulnerable age groups, especially mothers and children.[7] In response to India's high burden of anaemia among children, the Government of India introduced the National Iron Plus initiative which mandates biweekly administration of iron and folic acid syrup to children aged 6 months to 5 years of age along with bi-annual deworming. The objective of the study was to find the coverage of IFA and Vitamin A supplementation among children aged between 9 months and 5 years and to find out the barriers in administrating these supplements to children.

Material and Methods

Study design and setting

This explanatory sequential mixed method study (QUAN qual) was conducted in the field practice area of Thirubuvanai primary health centre. In the quantitative survey, a cross-sectional cluster sampling survey was conducted to find the coverage of IFA and Vitamin A supplementation among children, followed by a qualitative survey to find out the barriers in administrating these supplements to children. The study was conducted for a period of 3 months between January 2023 and March 2023 after getting clearance from the institutional ethical committee. The study participants were mothers/caregivers of children between 9 months and 5 years of age.

Data collection procedure

Quantitative survey

In the quantitative survey, a total of 215 children were included in the study. WHO EPI Cluster sampling method was used.[8] Clusters were selected with probability proportional to community population size. In each selected cluster from a central point, a random direction was selected and from that point household was randomly along the line from the centre to the edge of the household. Within each eligible household, only one eligible child was selected to be the focus of the survey. If multiple children lived in the household, the selection of the child was done at random using the lottery method. For data collection, mothers of children aged between 9 months and 5 years of age were interviewed using a pre-designed questionnaire. The survey tool was developed in pretested and adopted according to the nature of the responses. Age-appropriate subgroups such as 9 months to 59 months and 12 months to 59 months were enquired on IFA and Vitamin A supplementation and deworming status, respectively.

Qualitative survey

For the qualitative survey, purposive sampling was used. Data was collected from 14 In-depth interview (IDI). In-depth interview was conducted after obtaining informed and written consent from selected mothers whose children were not given supplements as per requirements. In-depth interview lasted for a period of 45–50 min. The IDI was conducted by principal investigators who were trained in qualitative research. With the help of semi-structured interview guide with appropriate probing, IDI was conducted in the participant's residents during their free time in Tamil as preferred by participants. The discussion was audio recorded and taped data was used to draft the transcript from which key messages were framed under five categories. The transcript was checked by senior faculty who was trained in qualitative research which increases the internal validity of the study.

Data analysis

Data was analysed using SPSS statistical software version 24. The categorical variables were measured as frequency and proportion. Chi-square test was used to find the association. Manual content analysis of the transcribed information was done. To increase the validity of the study, the transcript was independently analysed and the findings were later reviewed by trained faculty trained in qualitative research. 'Consolidation criteria for reporting qualitative research' guidelines were used for reporting the findings. The good reporting of mixed method study (GRAMMS) guidelines was used for reporting the findings.

Results

In this study out of the 215 children recruited, 35.3% of the study participants belonged to 9–11 months of age, 56.7% were male, 61.8% belonged to birth order one, 81.9% were delivered at the public hospital, 26% don't know their community, 48.4% of the mothers have completed till higher secondary education, 70.2% of the mothers were homemakers, 75.3% belonged to the nuclear family, 96.3% were Hindu by religion, 46.7% of the mothers have received information about IFA and Vitamin A supplementation from healthcare workers. [Table 1].

From Table 2, among the mothers interviewed 55.3% of the children did not take two doses of IFA syrup in the last 7 days before the survey and 31.2% had taken IFA syrup and 13.5% of the mothers did not know whether the child was given IFA syrup. The majority of the children (60%) of the children have not been given IFA syrup in the last 30 days preceding the survey, whereas 23.7% of the children have been given the syrup and 46.5% of the children have been given Vitamin A supplementation in the last 6 months before the survey, whereas 43.7% were not given Vitamin A supplementation. Deworming tablets were given to 58.3% of 139 children aged 1 to 5 years in the last 6 months before the survey.

On analysis of Vitamin A-first dose supplement with sociodemographic variables in Table 3, a significant association was found among age (P value = 0.0001) and place of delivery (P value = 0.016), and on analysis of IFA with sociodemographic variables in Table 4, a significant association was found among occupation of the parents (P value = 0.017).

Qualitative

The Four categories that emerged from in-depth Interview from Parents who have not been given Iron and Folic acid and Vit A syrup [Table 1] are mentioned below:

Category 1: Lack of awareness: It is a major barrier to nonutilization of services offered by the Government. Hence, repeated reinforcement has to be made by field workers.

Table 1: Baseline characteristics of the study population (*n*=215)

Variable	*n* (%)
Age group of children	
9–11 months	76 (35.3)
12–23 months	65 (30.2)
24–35 months	26 (12.1)
36–46 months	25 (11.6)
47–59 months	23 (10.7)
Gender	
Male	122 (56.7)
Female	93 (43.2)
Birth order	
1	133 (61.8)
2	75 (34.8)
3	5 (2.3)
Place of delivery	
Public health facility	176 (81.9)
Private hospital	39 (18.1)
Community	
General	40 (18.0)
BC	43 (20.0)
MBC	37 (17.2)
SC/ST	39 (18.1)
Don't know	56 (26.0)
Education of the mother	
Illiterate	5 (2.3)
Primary and middle school	23 (10.7)
Higher secondary	104 (48.4)
Undergraduate and above	83 (38.6)
Mother's occupation	
Government employee	6 (2.8)
Business	27 (12.6)
Daily wages	8 (3.7)
Homemaker	151 (70.2)
Type of the family	
Nuclear family	162 (75.3)
Joint family	51 (23.7)
Extended family	2 (0.9)
Religion	
Hindu	207 (96.3)
Muslim	5 (2.3)
Christian	3 (1.4)
Information about IFA and Vitamin A supplementation	
No exposure	80 (37.2)
TV/mass media	8 (3.7)
Friends	10 (4.7)
Relatives	13 (6.0)
Healthcare worker	99 (46.7)

"I have studied only upto 2nd std I dint know when and how to give iron and vit A supplements"

"As you are saying supplements are good and available free of cost, I dint know in which hospital it will be available"

Category 2: Attitudes towards supplementations—Especially in Rural parts, there exist lots of myths and misbeliefs. Parents always have the habit of comparing themselves with other children in the village. If one parent is not willing others will not neglect it.

Table 2: Coverage of IFA and VAS in children (*n*=215)

Variable	*n* (%)
IFA syrup (two doses) given to children aged 9 months to 5 years in the last 7 days before the survey	
Yes	67 (31.2)
No	119 (55.3)
Don't know	29 (13.5)
IFA syrup given regularly (biweekly) to children in the last 30 days preceding the survey	
Yes	51 (23.7)
No	129 (60.0)
Don't know	35 (16.3)
VAS given to children aged 9 months to 5 years in the last 6 months before the survey	
Yes	100 (46.5)
No	94 (43.7)
Don't know	21 (9.8)
Deworming tablets given to children aged 1 to 5 years in the last 6 months before the survey (*n*=139)	
Yes	81 (58.3)
No	42 (30.2)
Don't know	16 (11.5)

"Since I am feeding my child with proper nutrition like green leafy vegetables, eggs, milk I feel it is unnecessary to give medicines"

"Only when child is sick we should treat them with medicines. for healthy child syrup is unnecessary"

"When I was child I dint take any iron syrup and I am healthy. Hence I don't want to give for my child"

Category 3: Fear of adverse effects: The main side effects of iron are nausea and vomiting. Vitamin A syrup due to its oil consistency child tends to vomit.

"Once when iron syrup was given in syrup in the school my child vomited. Hence she refuses to take it"

"It taste like metal hence my child will run away when I force her to drink. Similarly Vit A syrup is like oil I feel it will not get digested"

"My child passes black stools after taking the syrup and some time she will also be having nausea"

Category 4: Lack of family support—In a country like India which is culture bound, joint families still exist in some parts of rural. Decision-making in the family is very crucial made by the elder person in the family. Hence not only the parents have to be given awareness but the entire family.

"My mother-in-law feels taking iron syrup will decrease the colour of child so she doesn't allow me to give her"

"My husband doesn't help me to take child to the hospital he feel there will be long waiting hours"

Table 3: Association of socio-demographic variables with VAS status (*n*=215)

Variables	VAS given to children in the last 6 months preceding the survey *n* (%)			*P*
	Don't know	No	Yes	
1. Age				
9 m–1 year	7 (33.3)	48 (51.0)	21 (21.0)	0.0001*
1–2 years	4 (19.0)	18 (19.1)	43 (43.0)	
2–3 years	1 (4.8)	9 (9.5)	16 (16.0)	
3–4 years	5 (23.8)	9 (9.5)	11 (51.0)	
4–5 years	4 (19.0)	10 (10.6)	9 (42.0)	
2. Gender				
Male	14 (66.7)	54 (57.4)	54 (54.0)	0.558
Female	7 (33.3)	40 (42.6)	46 (46.0)	
3. Birth order				
1	9 (42.8)	67 (71.3)	59 (59.0)	
2	11 (52.4)	25 (26.6)	39 (39.0)	0.116
3	1 (4.8)	2 (2.1)	2 (2.0)	
4. Place of delivery				
Public hospital	16 (76.2)	85 (90.4)	75 (75.0)	
Private hospital	5 (23.8)	9 (9.6)	25 (25.0)	0.016*
5. Education of the mother				
Illiterate	0	4 (4.3)	1 (1.0)	
Primary and middle school	4 (19.0)	13 (13.8)	6 (6.0)	0.157
Higher secondary	7 (33.3)	44 (46.8)	53 (53.0)	
Undergraduate and above	10 (47.7)	33 (35.1)	40 (40.0)	
6. Occupation of the mother				
Government employee	1 (4.8)	1 (1.1)	4 (4.0)	
Business	4 (19.0)	9 (9.6)	14 (14.0)	0.27
Daily wages	2 (9.5)	14 (14.8)	2 (2.0)	
Homemaker	10 (47.6)	71 (75.5)	71 (71.0)	
7. Type of the family				
Nuclear family	17 (80.9)	71 (75.5)	74 (74.0)	0.597
Joint family	4 (19.1)	22 (23.4)	25 (25.0)	
Extended family	0 (0.0)	1 (1.1)	1 (1.0)	

*$P<0.05$ is statistically significant

Discussion

In our study, Vitamin A supplementation coverage was taken only by 42% of the children in the last 6 months preceding the survey. According to the National Family Health Survey (NFHS-5), the coverage of Vitamin A supplementation in Puducherry was 81.2% low. However, our study reported a low coverage compared to the NFHS-5 survey.[9] This is mainly due to the fact of lack of awareness among mothers regarding the importance of Vitamin A Supplementation and the availability of the supplementation in the health facility. This was similar to that of the study conducted by Sachdev *et al.*[6] at Uttar Pradesh. Among the age group, it was found that 41% of the children of 1–2 years were given supplementation and was only 16% among the age group of 2–3 years. This is due to the caregivers who did not seek proper healthcare services once the child completes the vaccination schedule at 9 months of age. When Vitamin A-first dose supplement was analysed along with other selected variables, a significant association was found among age (*P* value = 0.0001**)** and place of delivery (*P* value = 0.016), indicating that socio-economic characteristics play an important role in the coverage evaluation of Vitamin A supplementation among under five children. This was similar to that of the studies done in rural Pakistan by Changezi F.[10] Another reason for poor coverage is maternal educational disparities. In our study, it was found that supplementation was more among the mothers who had higher level of education than that of mothers who had little education or no formal education. This was similar to that of the previous studies done in India[11-16]

According to NFHS 5, the percentage of children age 6–59 months who are anaemic in Puducherry was 64.0%.[9] In our study, iron and folic acid supplementation was taken by 31.2% of the children in the last seven days preceding the survey. The coverage of iron and folic acid supplementation in India among 6–59 months after the launch of anaemia Mukt Bharat was increased from 7 to 15%.[17] Our study found that a lack of awareness among the mothers regarding the importance of iron supplementation in a child's growth was the main reason for poor supplementation coverage. When the IFA supplement was analysed along with other selected variables, a significant association was found among the occupation of the parents (*P* value = 0.017). In our study, it was found that 34.2% of the parents were doing business and due to which they were aware of the services and might know how to supplement their children with healthy syrup.

Table 4: Association of socio-demographic variables with IFA supplementation (*n*=215)

Variables	IFA syrup (two doses) given to children in the last 7 days preceding the survey			*P*
	Don't know	No	Yes	
1. Age				
9 m–1 year	5 (17.2)	52 (43.7)	19 (28.4)	0.083
1–2 years	8 (27.6)	34 (28.6)	23 (34.3)	
2–3 years	4 (13.8)	11 (9.2)	11 (16.4)	
3–4 years	6 (20.7)	10 (8.4)	9 (13.4)	
4–5 years	6 (20.7)	12 (10.1)	5 (7.5)	
2. Gender				
Male	18 (62.1)	68 (57.1)	36 (53.7)	
Female	11 (37.9)	51 (42.9)	31 (46.3)	0.744
3. Birth order				
1	15 (51.7)	82 (68.9)	38 (56.7)	
2	13 (44.8)	34 (28.6)	28 (41.8)	0.273
3	1 (3.4)	3 (2.5)	1 (1.5)	
4. Place of delivery				
Public hospital	24 (82.8)	100 (84.0)	52 (77.6)	
Private hospital	5 (17.2)	19 (16.0)	15 (22.4)	0.546
5. Education of the mother				
Illiterate	0 (0.0)	4 (3.7)	1 (1.5)	
Primary	2 (6.90)	13 (10.9)	8 (11.9)	0.334
Higher secondary	12 (41.4)	64 (53.8)	28 (41.8)	
Undergraduate and above	15 (51.7)	38 (31.9)	30 (20.9)	
6. Occupation				
Government employee	3 (10.3)	3 (2.5)	0 (0.0)	
Business	7 (24.1)	19 (16.0)	23 (34.2)	0.017*
Daily wages	1 (3.4)	5 (4.2)	2 (3.1)	
Unemployed	18 (62.1)	92 (77.3)	42 (1.7)	
7. Type of the family				
Nuclear family	23 (79.3)	87 (73.1)	52 (77.6)	0.861
Joint family	6 (20.7)	31 (26.1)	14 (20.9)	
Extended family	0 (0.0)	1 (0.8)	1 (1.5)	

*Indicates $P<0.05$

In our study, the lack of awareness of the availability of services at a government facility, fear of myths regarding the intake of supplements, fear of adverse effects, and lack of family support were found to be the barriers for ineffective supplementation of Vitamin A and iron and folic acid among children. This was similar to that of a study conducted by Zegeye *et al.*[18] which found that distance to the health facility, going alone to the hospital, or getting permission from the family members to take the child to the hospital were found as the barriers in accessing healthcare services. A study conducted by Mostafa I *et al.*[19] found that the absence of knowledge on seeking immunization services and the spread of rumours on the side effects of the vaccination disrupted the proper coverage. Another study conducted by Bendech MA *et al.*[15] found that lack of knowledge which might be an important reason for their not participating in supplementation programmes may be the barrier to receiving the supplementation. This was similar to our study where mothers lack appropriate information about where to get the vaccination regarding the time and place of distribution in the community. In our study, it was also found that some of the mothers decided not to give the supplement unnecessarily when the child was healthy and nonpalatability of the syrup was also found as some of the barriers for poor coverage. These findings were similar to that of the study conducted by Misra JP, in Puducherry.[20]

Measures should be taken to enhance proper coverage of the supplementation services. Mothers visiting the well-baby clinic should be educated on the importance of the supplementation and its importance on the growing child by ANM and ASHA. Educating family members about the supplementation is beneficial. It is also critical for healthcare providers to emphasize the availability of supplementation, and the advantages of taking supplementation by issuing health education materials for the mothers visiting the health centre. Field-level workers, like ANM and ASHA, may also visit households of left-out children and ensure they have taken the supplementation for the age.

Conclusion

In the study, it was found that Vit A coverage was taken only by 42% of the children. The study findings have highlighted the need for community health education in improving the coverage of supplements administration. It also calls for improving capacity building of health workers.

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Conflicts of interest

There are no conflicts of interest.

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