

# Peri-conceptual supplementation of folic acid-knowledge and practices of pregnant women and health providers

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## ABSTRACT

**Context:** Neural tube defects (NTDs) are one of the most common congenital anomalies. NTDs are preventable if folic acid (FA) is supplemented before and during conception. Knowledge and supplementation of FA by pregnant women as well as its timely provision by health providers is crucial in reducing the burden of NTDs in the community. **Aim:** To study the knowledge and supplementation of FA by pregnant women and its prescription/provision by health providers. **Settings and Design:** A cross-sectional study was conducted in the block Doiwala, District Dehradun, Uttarakhand. **Subjects and Methods:** A total of 400 pregnant women and 121 government health providers (5 medical officers, 25 auxiliary nurse midwives [ANMs], and 91 accredited social health activists [ASHAs]) were interviewed on predesigned, pretested questionnaire by study/field investigator. **Statistical Analysis Used:** Proportion of different variables calculated and Chi-square test with Yates correction was applied. **Results:** Of 400, 73.50% of women had heard of FA. Overall, knowledge scores suggested intermediate to low level of knowledge about FA. Totally 94.25% of women had planned pregnancies; however, only 4.75% of women reported FA supplementation before conception. This indicates that if these women would have been properly counseled and prescribed FA, they might have taken it. About 60% of medical officers, 4% of ANMs, and 3.3% of ASHAs knew FA deficiency as one of the causes of NTD. None of the health providers reported to be prescribing/counseling FA to pregnant women. FA was out of supply on the block at the time of the study. **Conclusions:** Knowledge and supplementation practices related with FA are poor.

**Keywords:** Folic acid supplementation, health provider, pregnant women

## Introduction

After conquering many communicable diseases, it is time to stress on other causes of neonatal and infant mortality. Congenital malformations are one of the important causes among them. Among all the congenital malformations neural tube defects (NTDs) are one of the most common congenital anomalies, others being cardiac defects and down

syndrome.<sup>[1]</sup> NTDs arise due to the failure of closure of neural tube during embryogenesis which usually occurs at 21–28 days postconceptionally.<sup>[2]</sup> These defects are usually associated with other congenital anomalies and dysfunction of various other organ systems. Many affected children would have lower body paralysis, bladder and bowel dysfunction, learning disabilities, hydrocephalus due to Arnold-Chiari Type 2 malformation, and endocrinal abnormalities. All this leads to significant physical disability, psychosocial maladjustments and increased financial burden on the family.<sup>[3]</sup>

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Globally each year 0.3–0.4 million infants are born with spinabifida and anencephaly.<sup>[4]</sup> The prevalence is approximately 1–5/1000 live births and the risk of recurrence is 2–3%.<sup>[5]</sup> In India, an overall birth prevalence of 4.1/1000 (95% confidence interval [CI] 3.1–5.4) was reported by Bhide *et al.*<sup>[6]</sup> In the systematic review of 19 trials done by them, the live birth and stillbirth prevalence of NTDs was found to be 1.3/1000 births (95% CI, 0.9–1.8) and 1.7/1000 births (95% CI, 0.7–4.0), respectively.<sup>[6]</sup> This translates into a large number of children born with NTDs. Those with severe defects like anencephaly do not survive and many others affected live with some or other disability. By this NTDs constitute a public health problem in our country which can be controlled.

A large body of evidence in the form of number of clinical trials is there which supports that NTDs are preventable if folic acid (FA) is supplemented before and during conception.<sup>[7-9]</sup> The reduction of defects may be to the tune of 75%.<sup>[2]</sup> WHO recommends that all women, from the moment they begin trying to conceive until 12 weeks of gestation should take an FA supplement. Women who have had a fetus diagnosed as affected by NTDs or have given birth to a baby with NTD, should receive information on the risk of recurrence, be advised on the protective effect of peri-conceptual FA supplementation and be offered high-dose supplementation.<sup>[1]</sup>

Recently under Reproductive and Child Health Programme (RCH), Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH + A) strategy has been formulated by Government of India (GOI). According to this strategy, it has been suggested that women having planned pregnancies should be supplemented with FA starting from 3 months before conception in a dose of 400 µg daily.<sup>[10]</sup> Furthermore, the intervention of supplementation of every pregnant woman with iron FA (IFA) after the first trimester is already in place for preventing iron deficiency and FA deficiency anemia during pregnancy. Accredited social health activists (ASHAs) being the frontline workers are given the onus of spreading the awareness on such health interventions as well as identifying the planned pregnancies and carry out this supplementation of FA in villages. They are incentivized for delaying the birth of first child and for spacing between births and thus identification become easy for them. Besides ASHAs, auxiliary nurse midwife (ANMs) and medical officers are also supposed to spread awareness in the community and undertake this intervention of peri-conceptual FA supplementation to prevent NTDs and other congenital anomalies.

Hence, the knowledge and supplementation of FA by pregnant women as well as its timely provision by health providers including frontline workers are crucial in determining the success of the program and reducing the burden of NTDs in the community. There is very limited data available on the subject from the country. Hence, this study was taken up to study knowledge and supplementation of FA by pregnant women as a primary objective. The study has also attempted to assess knowledge

and FA prescription/provision practices of health providers to identify various gaps and providing necessary recommendations to improve on the situation.

## Subjects and Methods

The present research paper is developed out of the comprehensive intramural research project entitled “A KAP study on FA supplementation – Perspective of health providers and pregnant women and assessment of serum FA among pregnant women of Block Doiwala, District Dehradun.”

A cross-sectional study was conducted from August 15, 2014, to August 07, 2015 after approval from the Institutional Ethics Committee.

Uttarakhand is one of the newly formed state of the country (India). District Dehradun is one of 13 districts of the state with total six blocks. Out of six blocks - Doiwala block was randomly selected.

It was estimated that a sample of 400 pregnant women would be required based on presumed prevalence of knowledge of FA as 50% (no previous data on the mentioned indicator was available from the region) with an allowable error of 5% at 95% confidence level.

Doiwala block has six primary health centers (PHCs) and 23 sub-center (SC), all the health providers (5 medical officers and 23 ANMs) and 91ASHAs were included in the study to assess the knowledge and prescription/provision practices of health providers.

Pregnant women were recruited in the study from the antenatal clinics organized weekly at SCs of the block. As on an average 6–7 pregnant women attend these antenatal clinics. Hence all the women attending the clinic for the day were recruited from March 09, 2015 to the desired sample size was achieved on August 07, 2015. Any women found seriously ill or having diarrhea, steatorrhea, and hyperemesis was excluded as these diseases have been reported to vary the serum FA level. (Assessment of serum FA was the part of overall intramural project).

Informed consent in writing was obtained from all the study participants before interview. Data were collected using predesigned and pretested questionnaire, which was administered by the study investigators and field staff after 1 day of orientation.

Questionnaire for the pregnant women included information regarding their biosocial profile, history of any abortion, birth of child with congenital defect, especially NTD, awareness of FA, it's sources and its importance, the current practice of FA intake/history of starting FA preconceptionally, etc.

Questionnaire for the health provider included indicators regarding their biosocial profile, any previous training on the

subject, knowledge about the importance of FA, its dosage, schedule, their practice of prescribing it preconceptionally, report of any child with NTD, availability of FA at PHCs and SCs, etc.

Data were analyzed using Microsoft Excel 2007. The categorical variables were presented as frequency and percentages.

A knowledge score was computed based on six indicators – (1) whether participants ever heard about FA, (2) their knowledge regarding its requirement during pregnancy, (3) whether they knew that it prevents from NTDs, (4) whether they knew that it prevents from other congenital defects, (5) whether they knew that it prevents from anemia and (6) whether they knew that it should be taken peri-conceptionally. Each correct response was awarded 1 score, as the scoring was done for six indicators hence maximum score possible was six for each woman. Then by summing all correct responses for each woman, knowledge scores were computed for all the women. Women scoring  $\leq 2$  were termed as low scorers while women scoring more than 4 were to be termed as high scorers. Rest of the women scoring 3–4 were termed as intermediate scorers.

Association between knowledge scores and various sociodemographic factors was determined by using Chi-square test.

## Results

Totally 400 pregnant women participated in the study. The mean age of the study participants was  $24.62 \pm 2.95$  years. The majority of them were housewife (384) and Hindu (349) by religion. Fifty-eight (14.5%) pregnant women were illiterate. Approximately half of them (198) were primigravida. Thirty-five (8.75%) out of these 400 women gave a positive history of abortion or still birth in the past whereas 365 (91.25%) did not report any event suggestive of bad obstetric history. Four women reported that a baby affected with NTD was born to their relatives and two women reported to bear such a baby themselves in the past. Unexpectedly, 377 out of 400 (94.25%) pregnancies were reported to be planned.

Regarding knowledge about FA, 294 out of 400 women (73.50%) had heard of FA ever in their life. Remarkably 123 out of 400 women (30.75%) knew that FA reduces anemia whereas only one woman knew about other role of FA, i.e., it reduces the incidence of NTDs. Overall, knowledge scores were calculated by summing the correct responses of each woman regarding knowledge about FA and scores are presented in Table 1.

Only six women (1.5%) had knowledge scores equal to 4. Rest of them scored  $< 4$  suggesting intermediate to low level of knowledge among pregnant women. The knowledge score was more among literates as compared to illiterates and this difference was found to be significant [Table 2].

**Table 1: Knowledge scores of pregnant women**

Knowledge score	Number of pregnant women (%)
Low score (0-2)	323 (80.7)
Intermediate score (3-4)	77 (19.3)
High score ( $> 4$ )	0 (0)

In this study, only 19 (4.75%) pregnant women reported to be taking FA from some time before the conception. All of them were specifically advised for the same by the doctors. Rest of them were not advised for FA supplementation by any health provider. When asked for number of weeks before conception that they were consuming FA, it was found that only three women had consumed FA from at least 12 weeks before conception as per GOI recommendations, whereas others had taken it just 1–2 weeks prior.

As far as consumption of FA along with iron, i.e., IFA is concerned (as per GOI guidelines under RCH Programme - every pregnant woman should take minimum 100 IFA tablets (one tablet per day) starting from the second trimester for prevention of anemia), only 169 women (42.25%) reported that they were consuming IFA tablets. Rest of them reported that either they were not advised, IFA was not available at the health center, or they faced some side effect, as a reason for not consuming IFA.

When the knowledge of health providers of the same area was assessed (5 medical officers, 23 ANMs, and 91 ASHAs participated in this study) it was found that 60% of medical officers were knowing FA deficiency as one of the causes of NTD while only 4% of ANMs and 3.3% of ASHAs were aware of this fact. The rest of the comparative knowledge assessment of various health providers/counselors (medical officers, ANMs, and ASHAs) is tabulated in Table 3. Regarding availability of FA it was reported that FA tablets were not in routine supply. Even IFA tablets were not available at any ANM center at the time of the study (March 2014–August 2015). It was further reported by health providers that IFA remains available on an average for 3–4 months only during a year [Table 3].

## Discussion

FA is a vitamin which has important role in proper cell division and other metabolic processes. Since many years, under RCH program FA has been supplemented with iron for the prevention of anemia in pregnant women with the recommended dosage of 500  $\mu\text{g}$  along with 100 mg elemental iron starting from the second trimester. However, recently FA's role in the prevention of NTDs and other congenital anomalies has been reemphasized and now the recommendation is to supplement FA in a dosage of 400  $\mu\text{g}$  at least 3 month before pregnancy and to continue 3 months after conception, followed by IFA tablets. Implementation of this guideline is not much difficult if medical officers and ANMs duly prescribe FA at least for those women who are having planned pregnancies. ASHA worker, who is a crucial link between

**Table 2: Knowledge and practices of pregnant women in relation to various sociodemographic factors**

Biodemographic variables	n=400	Heard about folic acid, n=294 (73.5%)	Knew folic acid reduces Anaemia, n=123 (30.8%)	Folic acid taken pre-pregnancy, n=19 (4.8%)	Advised to take IFA during pregnancy, n=250 (62.5%)	IFA taken during pregnancy, n=169 (42.3%)	Total knowledge score $\geq 3$ , n=77 (19.3%)	Significance level
Age group (years)								
<25	195	140 (71.8)	87 (44.6)	9 (4.6)	170 (87.2)	78 (40)	37 (19.0)	NS
25-30	191	146 (76.4)	33 (17.3)	6 (3.1)	71 (37.2)	84 (44)	39 (20.4)	
>30	14	8 (57.1)	3 (21.4)	4 (28.6)	9 (64.3)	7 (50)	1 (7.1)	
Education (class)								
Illiterate	59	33 (55.9)	8 (13.6)	1 (1.7)	27 (45.8)	16 (27.1)	3 (5.1)	Yates corrected
Up to 8 <sup>th</sup>	89	64 (71.9)	22 (24.7)	3 (3.4)	49 (55.1)	30 (33.7)	13 (14.6)	$\chi^2=7.897$
9-12 <sup>th</sup>	161	125 (77.6)	56 (34.8)	7 (4.3)	108 (67.1)	72 (44.7)	37 (23.0)	P=0.005
Graduate or postgraduate	91	72 (79.1)	37 (40.7)	8 (8.8)	66 (72.5)	51 (56)	24 (26.4)	
Occupation								
House wife	384	286 (74.5)	120 (31.3)	18 (4.7)	240 (62.5)	165 (43)	76 (19.8)	NS
Others	16	8 (50)	3 (18.8)	1 (6.3)	10 (62.5)	4 (25)	1 (6.3)	
Religion								
Hindu	349	255 (73.1)	110 (31.5)	17 (4.9)	220 (63)	148 (42.4)	69 (19.8)	NS
Muslim	49	37 (75.5)	11 (22.4)	2 (4.1)	28 (57.1)	19 (38.8)	6 (12.2)	
Sikh	2	2 (100)	2 (100)	0 (0)	2 (100)	2 (100)	2 (100.0)	
Type of family								
Nuclear	151	110 (72.8)	47 (31.1)	6 (4)	96 (63.6)	58 (38.4)	35 (23.2)	NS
Joint family	249	184 (73.9)	76 (30.5)	13 (5.2)	154 (61.8)	111 (44.6)	42 (16.9)	
Economic status								
BPL card holder	95	62 (65.3)	21 (22.1)	3 (3.2)	54 (56.8)	32 (33.7)	13 (13.7)	NS
APL card holder	143	120 (83.9)	59 (41.3)	6 (4.2)	101 (70.6)	75 (52.4)	39 (27.3)	
Don't know/no card	162	112 (69.1)	43 (26.6)	10 (6.2)	95 (58.6)	62 (38.3)	25 (15.4)	
Parity								
Primigravida (first pregnancy)	198	145 (73.2)	56 (28.3)	7 (3.5)	126 (63.6)	84 (42.4)	35 (17.7)	NS
>1	202	149 (73.8)	67 (33.2)	12 (5.9)	124 (61.4)	85 (42.1)	42 (20.8)	
Obstetric history								
Previous abortion/ still birth	35	11 (31.4)	7 (20)	2 (5.7)	19 (54.3)	11 (31.4)	5 (14.3)	NS
None	365	283 (77.5)	116 (31.8)	17 (4.7)	231 (63.3)	158 (43.3)	72 (19.7)	
Planned pregnancy								
Yes	377	279 (74)	117 (31)	18 (4.8)	240 (63.7)	159 (42.2)	72 (19.1)	NS
No	23	15 (65.2)	6 (26.1)	1 (4.3)	10 (43.5)	9 (39.1)	5 (21.7)	

NS: Not significant; BPL: Below poverty line; APL: Above poverty line; IFA: Iron folic acid

service providers and community can play a vital role, as she is the one who remains in contact with the women of her area for contraceptive supplies and for other reasons, so she can easily identify those women who are planning for conception, and can easily motivate them to approach medical officers/ANMs for pre-conceptional FA supplementation.

Now if we look at the study findings, it reveals that FA might be known to women of the area, but its importance is still unknown to many. These results are consistent with many other studies conducted worldwide.<sup>[11-14]</sup> In all these studies, knowledge regarding intake of FA supplements during the peri-conceptional period was found to be poor. In this study, knowledge regarding FA was found to be more among literate women. Further, it was found to be more among those with senior secondary education and above as compared to those

having primary education. This result is in conformity with the findings of Hisam *et al.*,<sup>[11]</sup> Huan Liang *et al.*<sup>[15]</sup> and Kurian *et al.*<sup>[16]</sup> where the education status of women was found to be an important predictor of knowledge regarding FA intake during the peri-conceptional period.

In a country like ours, where the literacy status might have risen among women, but because of very high rate of school dropout, the higher education rate is still low. This feature makes the women in our country, especially those residing in the rural area, more and more susceptible to ignorance and lack of knowledge regarding the importance of FA intake. When compared with certain Indian studies, the results were found to be optimistic with 75% of women having heard of FA whereas in a study conducted in Southern India,<sup>[16]</sup> it was found that only 36.6% of study population had heard about FA but again the knowledge



**Table 3: Knowledge and practices of medical officers, auxiliary nurse midwives and accredited social health activists regarding folic acid supplementation and its availability**

Indicator	Medical officers (n=5) (%)	ANMs (n=25) (%)	ASHAs (n=91) (%)
Know folic acid as a vitamin	4 (80)	1 (4)	2 (2.2)
Know that folic acid is important for pregnant women	4 (80)	25 (100)	76 (83.5)
Know that folic acid prevents anemia	2 (40)	24 (96)	82 (90.1)
Know folic acid deficiency as one of the of the cause of NTD	3 (60)	1 (4)	3 (3.3)
Know genetic causes as important factor for NTD	0 (0)	0 (0)	5 (5.5)
Know that folic acid supplementation decreases the risk of having a (NTD) in pregnancy	1 (20)	0 (0)	0 (0)
Know that folic acid should be started preconceptionally	2 (40)	1 (4)	2 (2.2)
Know about the correct duration recommended for folic acid supplementation (3 months before to 3 months after conception)	0 (0)	0 (0)	2 (2.2)
Know about correct recommended doses of folic acid	2 (40)	2 (8)	2 (2.2)
Prescribing/counseling for preconceptional folic acid supplementation	2 (40)	0 (0)	2 (2.2)
Know about NTD recurrence ranges	2 (40)	0 (0)	1 (1.1)
Availability of folic acid tablet at the time of study	0 (0)	0 (0)	0 (0.0)
Availability of IFA at center (PHC/sub-center/with ASHA)	2 (40)	0 (0)	1 (1.1)

NTD: Neural tube defect; ASHA: Accredited social health activist; ANMs: Auxiliary nurse midwives; IFA: Iron folic acid

regarding its proper supplementation and benefits was lacking in both the studies. In this study, 30.8% women knew that it reduces anemia, but only one woman knew that it prevents NTDs and other birth defects which are very less in number when compared to the findings of the study in Southern India wherein 12% of women could state the correct effects of FA, if used peri-conceptionally. This regional difference could be due to the difference in the level of education in both the areas. However, the important reason for ignorance of women about the FAs role for NTDs prevention could be a lack of focused awareness programs on the issue. So far RCH Program has promoted IFA tablets for prevention and control of anemia only and its usage is recommended from second trimester. Hence women knew the FAs importance for anemia prevention while they lacked knowledge about its role in the prevention of NTDs and its preconceptional intake.

Another very important finding which has come out from the study is that 377 out of 400 pregnant women had planned pregnancy (94.25%), and out of these 377 pregnant women only 19 gave a history of taking FA preconceptionally as per the advice of their doctor. So, it shows missed opportunity in case of rest of the women where they could have been counseled and prescribed for preconceptional FA supplementation by ASHA and ANM/medical officer, respectively.

It is relevant here to discuss the poor knowledge level of health providers regarding FA supplementation as revealed in the study. Medical officers, ANMs or ASHAs are all actively involved in the care of pregnant women, if they are not aware of the correct guidelines of FA supplementation they will neither prescribe nor counsel the pregnant women for its intake. Major reason for the poor knowledge of health provider could be that in their routine RCH training this issue of FA supplementation during the preconceptional period is not being duly emphasized. Study results showed that most of the health provider had received at least one RCH training in the previous 2 years. Knowledge level

of health providers in the study was found to be poorer when compared to the health providers in the developed countries. In a study conducted in the USA in 2002–2003, it was found that over 88% of health providers knew when a woman should start taking FA for the prevention of NTDs; and over 85% knew FA supplementation is necessary during the peri-conceptional period<sup>[17]</sup> while in this study, 80% of medical officers knew that FA is important for women during pregnancy, but only 20% knew that it prevents from NTDs. In a study conducted in Iran, it was found that 34.7% of health practitioners knew about the importance of FA and its correct supplementation.<sup>[18]</sup>

Furthermore, as is evident from this study, the health providers themselves lack knowledge regarding proper supplementation of FA hence pregnant women are also not getting much enforcement from their side for FA consumption peri-conceptionally.

Next issue, regarding FA supplementation is its availability at health centers, study observation showed that FA was not available at any center (6 PHCs and 23 SC) during the data collection period. This could be one of the contributory factors for the reluctance of medical officers and ANMs in prescribing/counseling for FA supplementation. Moreover, poor availability of IFA tablets compounds the situation, as IFA were also unavailable at most of the health centers during the study period.

## Conclusions and Recommendations

Study has revealed that these days majority of the women are having planned pregnancies, so there is an opportunity for preconceptional FA supplementation. ASHAs can play a vital role in identifying and counseling such women. In fact in our cultural context where the first baby is expected as early as possible after marriage, newlyweds can be targeted for the counseling of FA. For utilizing this opportunity, it is important that health provider must have adequate knowledge about FA supplementation

guidelines and correctly prescribe/counsel women, which can be achieved through emphasizing the issue in their various RCH trainings. Further, availability of FA tablets and its information to the community through mass media approaches regarding its peri-conceptional use is necessary to finally achieve the goal of lowering NTDs incidence.

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### Conflicts of interest

There are no conflicts of interest.

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