Awareness of folic acid use among Saudi women attending outpatient clinics at King Fahad Medical City

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ABSTRACT

Context: Women should consume folic acid (FA) during pregnancy to prevent neural tube defects (NTDs) in their children. Awareness of FA use, dosage, and administration can affect the risk of child malformations and other pregnancy complications. Aims: The primary objective of this study was to assess knowledge about the role of FA intake among Saudi women of reproductive age. The secondary objective was to ascertain the use of FA supplements in Saudi Arabia and the age of gestation at which FA is taken. Settings and Design: This cross-sectional study used a simple random sampling method for selecting Saudi women attending outpatient clinics at King Fahad Medical City in Riyadh, Saudi Arabia. Materials and Methods: A random sample of 600 Saudi women aged 18–45 years was evaluated for their awareness of FA use. Participants completed a questionnaire comprising 16 questions. Six questions were demographic, and the remaining 10 fulfilled the study aims. Results: Women had high awareness about FA. Survey responses showed that 42.2% of women knew that FA should be taken before pregnancy, and 80.1% were aware that it prevents NTDs. A total of 46.8% women took FA during preconception. Healthcare professionals provided the information in 69.7% of the cases. Conclusion: We concluded that the lower number of deformities in Saudi Arabia is due to greater awareness of the importance of FA, which can likely be attributed to better education. Doctors and nurses should continue to encourage women to take FA supplements when planning their pregnancies.

Keywords: Folic acid, neural tube defects, pregnancy

Introduction

Folic acid (FA) is naturally present in various foods and helps the body generate new cells and synthesize new DNA, reducing fetal defects such as neural tube defects (NTDs).[1] Folate deficiency is one of the most common vitamin deficiencies in women during conception; one study reported that 25%–72% of pregnant women were folate-deficient.[2] A low level of maternal FA at conception can increase the risk of poor pregnancy outcomes.[3]

Therefore, the present cross-sectional study was conducted to report the awareness of FA use in Saudi women attending outpatient clinics at King Fahad Medical City (KFMC).

Materials and Methods

A cross-sectional study was conducted in outpatient clinics at KFMC, Riyadh, Kingdom of Saudi Arabia. Saudi women aged 18–45 years were included, and the target population was divided into two groups: pregnant women and non-pregnant women. Women on chemotherapy (gonadotoxic chemotherapy) and with diminished mental capacity were excluded.

The sample size was calculated by assuming that 58% of participants were knowledgeable about FA,[4] with a 95% confidence interval and 4% margin of error (to overcome design effect). In all, a total of 600 women were enrolled in the study. The sample population and outpatient clinics at KFMC (5 of 20) were selected using a simple random sampling method. Next, the list of eligible women who met the inclusion criteria was selected using a simple random sampling method. Before conducting
the primary fieldwork, researchers obtained approval from the Institutional Review Board at KFMC. Furthermore, the women participating in the study provided signed informed consent.

Data were collected with a questionnaire developed by Benner et al[9] that was translated into Arabic. The questionnaire was translated into Arabic by two subject experts well versed with both Arabic and English language and subsequently back-translated to ensure the validity of the questionnaire. In addition, a pilot study was performed to test the validity of the questionnaire by distributing the questionnaire among the first 30 women. After the pilot study, the questions were amended to confirm the validity of the study instrument. The questionnaire comprised 16 questions of which 6 questions were related to demographics and the remaining 10 questions fulfilled the study objectives. The various sections of the questionnaire were as follows:

1. Demographic information: age, maternal age, the level of education, employment, history of smoking, and number of children.
2. Study-specific information: awareness about the use of FA, source of information on FA, and age of gestation at which FA is taken.

Statistical analyses were performed using SPSS 22.0 software (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to characterize the distribution of the variables and the characteristics of the sample. Characteristics of study patients were reported as counts (percentage). Chi-square test was used to assess the association between demographic variables and responses. The results with a two-tailed $P$ value <0.05 were deemed statistically significant.

### Results

Of the 600 participants, 47.8% (287) were aged 31 years and older, 34.2% (205) were aged 26–30 years, and only 5.2% (31) were aged 15–20 years [Table 1]. About 73.7% (442) of women in the study were married, 19.0% (114) were single, 4.7% (28) were divorced, 2.7% (16) were widowed, and 32.0% (192) were nulliparous [Table 1].

Table 1: Demographic characteristics of participants

| Demographics | Characteristics | Frequency | Percentage |
|--------------|-----------------|-----------|------------|
| Age (years)  | 15-20           | 31        | 5.2        |
|              | 21-25           | 77        | 12.8       |
|              | 26-30           | 205       | 34.2       |
|              | >30             | 287       | 47.8       |
| Marital status | Married       | 442       | 73.7       |
|              | Single          | 114       | 19.0       |
|              | Divorced        | 28        | 4.7        |
|              | Widow           | 16        | 2.7        |
| Education    | Primary         | 47        | 7.8        |
|              | Intermediate    | 62        | 10.3       |
|              | Secondary       | 140       | 23.3       |
|              | Bachelor        | 323       | 53.8       |
|              | Postgraduate    | 28        | 4.7        |
| Smoking      | Never           | 586       | 97.7       |
|              | <5 times/day    | 4         | 0.7        |
|              | 5-10 times/day  | 4         | 0.7        |
|              | Stopped recently| 6         | 1.0        |
| Parity       | None            | 192       | 32.0       |
|              | One             | 60        | 10.0       |
|              | Two             | 88        | 14.7       |
|              | Three or more   | 260       | 43.3       |

Table 2 represents factors associated with the awareness of FA. Of the 600 women, only 6.7% (40) had never heard of FA, 5.5% (33) had gained knowledge about FA from television, and 6.3% (38) said they gained knowledge about FA from magazines and newspapers. Furthermore, 11.8% (71) responded that their friends informed them about FA, whereas the greatest number of women [69.7% (418)] said that they gained knowledge from doctors and nurses.

Of 479 women who were married at the time of the survey, 24.1% (117) had been pregnant before, whereas 74.5% (362) had never been pregnant. A total of 57.7% (64) had planned their pregnancy, whereas 42.3% (47) had an unplanned pregnancy. Moreover, 46.8% ($n = 52$) said that they had used FA before conception, 52.3% ($n = 58$) had started taking it within 3 months of pregnancy, and 0.9% ($n = 1$) began taking it within the first 6 months of pregnancy. The survey results showed that 83.4% ($n = 398$) had a previous history of FA use and 16.6% ($n = 79$) had no history of previous FA use. In the study, 61.1% ($n = 292$) had been pregnant three times and 17.8% ($n = 85$) two times, whereas around 10% ($n = 51$) had either one pregnancy or had never been pregnant. Survey results indicated that 8.1% ($n = 33$) of the participants had a child with deformities. Furthermore, 3.2% each ($n = 1$) had children with anal atresia, anencephaly, cleft palate, Crouzon syndrome, renal agenesis, spina bifida, or encephalopathy. About 9.7% ($n = 3$) had children with a cleft lip or a cleft lip with cleft palate. Furthermore, 16.1% ($n = 5$) had children with cardiac defects or cerebral palsy that was diagnosed at birth.

The survey results showed that 18.2% ($n = 109$) were able to correctly identify FA as a vitamin [Figure 1]. Around 42.2% ($n = 253$) responded that FA should be taken before pregnancy [Figure 2], whereas 80.1% ($n = 480$) of women were aware that it is used to prevent NTDs [Figure 3].

Table 3 describes the association between the level of education and awareness of the appropriate time to take FA. Knowledge about the use of FA significantly directly correlated with the level of education ($P < 0.1$).

Table 4 compares the awareness of participants with gravidity. Knowledge about the most appropriate time to take FA and the role of FA in pregnancy was related to gravidity.
Discussion

Our study assessed the knowledge of women regarding FA at a tertiary care center in Riyadh. In outpatient clinics at KMFC, doctors and nurses provided sufficient information to their female Saudi patients. Other sources of information were friends, news, magazines, and television. A majority of women had more than two children and generally consumed FA during their pregnancies. Most women started taking FA during the preconception period, which is a crucial time to consume the vitamin because it reduces the chances for malformations. However, in unplanned pregnancies, a few women had not taken FA.

Table 2: Factors associated with awareness of folic acid

| Statement                          | Characteristics                  | Frequency | Percentage |
|------------------------------------|----------------------------------|-----------|------------|
| Source of information for FA       | Never heard of it                | 40        | 6.7        |
|                                    | From television and newspapers/magazines | 71       | 11.8      |
|                                    | From friends                     | 71        | 11.8      |
|                                    | From doctors/nurses              | 418       | 69.7      |
| Pregnant                           | Yes                              | 117       | 24.1      |
| Planned pregnancy                  | Yes                              | 64        | 57.7      |
| Age of gestation at which women started taking FA | Before conception | 52        | 46.8      |
|                                    | Within 3 months                  | 58        | 52.3      |
|                                    | Within 6 months                  | 1         | 0.9       |
| Previous FA intake                 | Yes                              | 398       | 83.4      |
| Gravidity                          | 0                                | 51        | 10.7      |
|                                    | 1                                | 50        | 10.5      |
|                                    | 2                                | 85        | 17.8      |
|                                    | 3                                | 292       | 61.1      |
| Child malformation                 | Yes                              | 33        | 8.1       |
|                                    | No                               | 370       | 90.7      |
| Type of malformation               | Anal atresia                     | 1         | 3.2       |
|                                    | Anencephaly                      | 1         | 3.2       |
|                                    | Cardiac defect                   | 5         | 16.1      |
|                                    | Cerebral palsy                   | 5         | 16.1      |
|                                    | Cleft lip and palate             | 3         | 9.7       |
|                                    | Cleft palate                     | 1         | 3.2       |
|                                    | Crouzon syndrome                 | 1         | 3.2       |
|                                    | Down syndrome                    | 5         | 16.1      |
|                                    | Renal agenesis                   | 1         | 3.2       |
|                                    | Spina bifida                     | 1         | 3.2       |

FA: Folic acid

Table 3: Association between correct responses of study participants and level of education (n=600)

| Question                          | Level of education               | P        |
|------------------------------------|----------------------------------|----------|
|                                    | Elementary (n=109)               | Secondary (n=140) | Bachelor or higher (n=351) |
| What do you think folic acid is?   | 24 (22.0%)                       | 19 (13.6%) | 66 (18.8%) | 0.21 |
| What is the most appropriate time to take folic acid? | 33 (30.3%)                       | 45 (32.1%) | 175 (49.9%) | <0.001 |
| What do you think folic acid does? | 75 (68.8%)                       | 110 (78.6%) | 295 (84.3%) | <0.01 |

Figure 1: Survey question: What do you think folic acid is?

Figure 2: Survey question: What is the most appropriate time to take folic acid?
Our study indicated that most women gained knowledge about FA from their doctors and nurses. Other studies have reported similar results; Al-Holy et al. concluded that doctors played a major role in providing FA education to women and recommended that doctors and the media should arrange educational sessions to explain the FA dosage pattern.[9]

Our study results on general FA knowledge are consistent with those of other studies conducted in Saudi Arabia.[5,6] However, our survey results revealed a significantly low rate of malformations in children because many Saudi women who attended outpatient clinics at KMFC had knowledge about the use and timing of taking FA. Furthermore, our results showed that 80.1% of women had specific knowledge that FA prevents neural deformities, which is higher than the percentage reported by most other recent studies[6–9] in Saudi Arabia. However, in 2013, Al-Holy et al. found a similar high rate of specific knowledge about the role of FA in pregnancy in a study conducted among 300 pregnant or non-pregnant women aged 19–45 years.[6] The research determined that 91% of women were aware of FA, 81% were knowledgeable that FA prevents NTDs, and 84% said that they had used FA during conception. However, only 10% said that they knew about the dosage and administration of FA.

Other studies in Saudi Arabia have shown lower rates of specific knowledge about the role of FA to prevent NTDs in comparison to our results. Women who live in urban areas may have access to better resources and educational services. In a study conducted in 2010 among 277 pregnant women in Abu Dhabi, Al Hossani et al. found that 79.1% of participants had heard about the use of FA in pregnancy.[11] However, only 46.6% had precise knowledge about the role of folate in preventing NTDs. The high rate of general knowledge about FA in pregnancy among the Abu Dhabi participants may be due to urban access to resources. A 2013 study conducted by Al-Darzi et al. showed that 53.8% of women in Egypt knew that FA is used to prevent NTDs,[10] whereas in 2012, Al-Hakeem found that 58% of women had heard of FA and 50.2% knew that FA prevented congenital abnormalities.[9] The women in our sample were more aware about FA because the level of awareness is comparatively more in an urban population than in a rural population.

Our finding that knowledge about the use of FA correlates with the level of education is supported by several previous studies showing that the level of education is directly linked to knowledge and awareness about FA.[4,9] Al Hossani et al. found that mothers’ level of education was the most important predicting factor affecting their knowledge about the importance of FA.[10] In 2013, Alakhfash et al. surveyed women at Maternity and Children's Hospital, Al-Qassim, to investigate FA use, importance, and duration of administration in Saudi women.[3] Their results indicated that education had a significant relationship with the use of FA in pregnancy.

In our study, most women started taking FA during the preconception period, which is a crucial time to consume the vitamin because it decreases the chance of malformations. Other studies have found lower rates of FA supplementation; Al Hossani et al. found that 69.7% of pregnant women reported taking FA during their current pregnancy. A total of 65.3% took FA after the first month of pregnancy, whereas only a minority (7.8%) took it before pregnancy.[10] Alakhfash et al. found that only 4.4% of women took FA during pregnancy.[7]

This study is limited because it reports the results of only one hospital in Saudi Arabia. It is possible that other hospitals may have different results. In addition, geographical variance may contribute toward knowledge regarding FA, which can also be a notable factor. Our study is a single-center study which aimed to show the impact of knowledge regarding FA supplementation on preventing NTDs.

Few studies on FA awareness and intake have been conducted in Saudi Arabia. Therefore, further studies are required to identify the level of knowledge of FA intake among Saudi women across the country, the potential benefits of taking FA during pregnancy, and the association between FA intake and other variables. There have been studies on FA perceptions in
other countries, and another avenue for future research is to compare rates of FA intake or knowledge between countries. A study in Lebanon found that while 60% of women surveyed had knowledge about FA, only 6.2% had taken FA before or during conception. In addition, future research should assess the need to improve access to education on the importance of folate supplementation, particularly through premartial counseling programs.

Future research should also compare FA education programs between countries to understand those which are most successful. For example, a study that was similar to this study was conducted in Turkey to evaluate the awareness of FA intake among women. When women were asked whether they had taken FA during their pregnancy, 48.6% said “Yes” for the third trimester, 18.4% said “No,” and 29.3% did not remember. The study concluded with the finding that 94.9% doctors or nutritionists were aware of FA use, but they were not sharing the information with patients.

FA deficiency is one of the most common vitamin deficiencies that can cause fetal NTDs and other malformations. It most frequently occurs during the early conception phase and can lead to fetal death. This deficiency can be prevented if more women are made aware about the duration and timing of the prophylaxis. Nutritionists and healthcare providers recommend taking FA as a part of prenatal care to reduce the risk of NTDs and other pregnancy-related complications. Furthermore, FA should be orally administered, and supplementation should begin before conception and throughout pregnancy. A low dose of FA (0.4 mg) is recommended before pregnancy. Pregnant women can increase their FA intake through drug and diet therapy. Doctors and nurses should encourage women to start taking FA supplements when planning their pregnancies. The most effective approach to combat the development of NTDs is daily supplementation with FA before pregnancy. Besides taking vitamin supplements, women should consume foods that naturally contain FA, which is essential for metabolism, reproduction, and DNA replication in pregnant women.

**Conclusion**

While most of the women in our study knew about the importance of FA and consumed it during pregnancy, the source of their information can be used to make recommendations for improving FA awareness in the country. Guidance material in pamphlets and magazines should be provided to women in outpatient clinics across Saudi Arabia. Furthermore, doctors and nurses across the country should be trained to provide FA information to patients to inform them of the benefits to their unborn children. Targeted media campaigns are another option because the women in our study often learned about FA from news, magazines, and television. It would be useful to conduct another similar study after efforts are made to expand FA awareness to assess the effectiveness of these efforts.

Our study results indicate that the lower number of deformities in Saudi Arabia is due to greater awareness of the importance of FA, which can likely be attributed to better education. In our study, most women learned about the importance of FA supplementation from doctors and nurses, who should ensure that they discuss the benefits of FA with all women who are of childbearing age. Through concentrated efforts health care providers, researchers, non-profits and other organizations can work together to reduce the risks of NTDs and other pregnancy-related complications and improve birth outcomes for women across Saudi Arabia.

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**Conflicts of interest**

There are no conflicts of interest.

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