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An exceptionally low percentage of Thai expectant mothers and medical personnel with folic acid knowledge and peri-conceptual consumption urges an urgent education program and/or food fortification

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Abstract

It has been widely accepted that peri-conceptual consumption of folic acid (FA) can prevent many congenital anomalies, including more than one-half of all neural tube defects. In several developed countries, educational campaigns and/or food fortification with FA have been launched, resulting in lower incidences of some anomalies. In Thailand, congenital anomalies preventable by FA are still an important public health problem. However, there have been no recommendations on the use of FA supplementations from the health authorities. In order to achieve a goal of reducing the diseases' incidences, our initial effort is to assess knowledge and use of peri-conceptual FA. We conducted a questionnaire survey of 500 pregnant women and 500 child-bearing-age female medical personnel in the King Chulalongkorn Memorial Hospital from June 2003 through December 2003. Of the 383 pregnant women who completed the survey, 23.5% (90/383) knew that FA helped to prevent birth defects, 3.4% (13/383) knew that FA should be taken before pregnancy, and only 0.3% (1/383) reported taking FA before pregnancy. Among the 422 female medical personnel who completed the survey, 84.4% (356/422) knew that FA could prevent birth defects, whereas 40.0% (169/422) knew that FA should be taken prior to pregnancy. This study provided strong evidence that educational campaigns and/or food fortification are urgently needed.

Keywords: *Folic acid, knowledge, use, pregnant women, medical personnel*

Introduction

Developing countries face many public health problems. Nutritional deficiencies and infectious diseases have long been given higher priorities, resulting in an improvement of the situation. On the contrary, very little attention has been paid to genetic and congenital disorders, making them an increasing proportion of the burden (Marques-de-Faria et al. 2004). The basic prevalence of genetic disorders in developing countries is not less than that in developed ones. Moreover, their effect on public health is even greater in populations of developing countries, in which the age distribution is skewed towards younger individuals (Alwan and Modell 2003).

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The recent advance in genetics undoubtedly offers unprecedented opportunities to all countries for understanding mechanisms and prevention of diseases. One of the most tangible benefits is the peri-conceptual use of folic acid (FA) to prevent many congenital anomalies (Botto et al. 2004). Since 1992, when the (Public Health Service. US. 1992) declared that all women planning to become pregnant should take at least 400 μg FA before pregnancy and for 12 weeks after conception, educational programs and other efforts have been launched to improve knowledge, attitude and use of the vitamin in many high-resource countries. These resulted in as high as 99.3% of pregnant women in an antenatal clinic of a developed country in 1998 having heard of FA, and nearly one-half having taken FA in the peri-conceptual period (Sen et al. 2001).

Thailand, however, still has no policy on this topic. Hence there are no recommendations on use of FA supplements from health authorities. This study, carried out at the King Chulalongkorn Memorial Hospital, Bangkok, Thailand, was designed to assess the knowledge of pregnant women and female medical personnel and the practice of the former group with regard to peri-conceptual FA intake.

Materials and methods

The study was conducted at King Chulalongkorn Memorial Hospital in Bangkok, the capital of Thailand, from June 2003 to December 2003. King Chulalongkorn Memorial Hospital is one of the largest and oldest tertiary care centers in Thailand with 1,440 beds and more than 1.1 million visits in the outpatient department and 10,000 births annually. Pregnant women seen at the antenatal clinic and child-bearing-age female medical personnel were asked to complete a survey about their knowledge and use of FA. A sample size of 500 in each group was estimated based on our pilot study showing the prevalence of people having correct knowledge of FA being able to prevent congenital anomalies of 40%. We divided medical personnel into five groups including medical doctors, medical students, nurses, nurse students and nurse assistants. We used quota sampling to include a similar number of personnel in each group.

The survey was a multiple-choice questionnaire and was divided into two parts. The first part included questions regarding age, education level, occupation, income, parity, and past history of birth defects. The second part included questions about the benefit of taking vitamins on prevention of birth defects, identification of vitamins associated with prevention of birth defects, and timing of taking vitamin supplementation. For the group of expectant mothers, we also asked whether they took vitamins prior to their current pregnancies.

The study was approved by the institutional review board of the Faculty of Medicine of Chulalongkorn University, and the written informed consent was obtained from each person included in the study. The survey was anonymous and confidential.

Data from incomplete questionnaires were excluded. Analysis was performed using SPSS 11.5. (SPSS Inc., Chicago, Illinois, USA) Univariate analysis was carried out using the chi-square test to demonstrate the association of the demographic variables with the knowledge of FA.

Results

Characteristics of pregnant women

In total, 383 pregnant women completed the questionnaire. Their characteristics are presented in Table I. Of the women, 70.5% were aged between 18 and 30 years, 74.2% graduated high school, and 52% had an average income of 6,000–50,000 baht per month (36 baht ~US\$1). Of the women, 57.4% and 42.6% were nulliparous and multiparous, respectively. One pregnant woman gave a history of a previous child with a neural tube defect (anencephaly).

Knowledge and use of FA in pregnant women

It was identified that 23.5% (90/383) of pregnant women knew that FA could prevent birth defects. Women were significantly more likely to know the fact if they were more educated ($P < 0.001$) and had more income ($P < 0.001$). Age and parity were not associated with the knowledge (Table II).

Of 383 pregnant women, 13 (3.4%) knew that FA should be taken before pregnancy, but only one pregnant woman (0.3%) reported taking FA before pregnancy. She also reported that, besides FA, vitamin C, vitamin A and calcium could prevent birth defects.

Table I. Characteristics of 383 pregnant women and 422 medical personnel who completed the survey.

Characteristic	Pregnant women (%)	Medical personnel (%)
Age		
<18 years	29 (7.6)	0 (0)
18–30 years	270 (70.5)	317 (75.1)
31–45 years	84 (21.9)	78 (18.5)
>45 years	0 (0)	27 (6.4)
Education		
High school	284 (74.2)	67 (15.9)
College/university	99 (25.8)	260 (61.6)
Postgraduate school	0 (0)	95 (22.5)
Occupation		
Physician	NA	89 (21.1)
Medical student	NA	71 (16.8)
Nurse	NA	105 (24.9)
Nurse student	NA	87 (20.6)
Nurse assistant	NA	70 (16.6)
Income per month		
No income	0 (0)	145 (34.4)
<6,000 baht	174 (45.4)	35 (8.3)
6,000–50,000 baht	199 (52)	242 (57.3)
>50,000 baht	10 (2.6)	0 (0)
First pregnancy		
Yes	220 (57.4)	NA
No	163 (42.6)	NA
Total	383	422

NA, not applicable/not available.

Table II. Knowledge on the use of FA for prevention of some congenital anomalies according to the characteristics of respondents.

Characteristic	Pregnant women		Medical personnel	
	Knowledge on vitamin use for prevention (%)	<i>P</i> value for univariate analysis	Knowledge on vitamin use for prevention (%)	<i>P</i> value for univariate analysis
Age				
<18 years	3 (10.3)	0.064**	NA	<0.001**
18–30 years	61 (22.6)		281 (88.6)	
31–45 years	26 (31.0)		59 (75.6)	
>45 years	NA		16 (59.3)	
Education				
High school	42 (14.8)	<0.001**	43 (64.2)	<0.001**
College/university	48 (48.5)		233 (89.6)	
Postgraduate school	NA		80 (84.2)	
Occupation				
Physician	NA	<0.001**	76 (85.4)	<0.001**
Medical student	NA		71 (100.0)	
Nurse	NA		83 (79.0)	
Nurse student	NA		80 (92.0)	
Nurse assistant	NA		46 (65.7)	
Income per month				
No income	NA	<0.001**	138 (95.2)	<0.001**
<6,000 baht	20 (11.5)		23 (65.7)	
6,000–50,000 baht	64 (32.2)		195 (80.6)	
>50,000 baht	6 (60.0)		NA	
First pregnancy				
Yes	49 (22.3)	0.511*	NA	NA
No	41 (25.2)		NA	
Total	90 (23.5)		356 (84.4)	

*Chi-square test, **chi-square test for trend. NA, not applicable/not available.

Of note, the pregnant woman who had a previous child with a neural tube defect did not know that FA could prevent some congenital anomalies and did not take FA before her current pregnancy.

Characteristics of medical personnel

In total, 422 female medical personnel completed the questionnaire. Their characteristics are presented in Table I: 75.1% were aged between 18 and 30 years. The five groups of medical personnel were approximately equally distributed. Nearly all the medical and nurse students had no income. Of 422 female medical personnel, 106 (25.1%) were married, 48 (11.4%) had one child, and 43 (10.2%) had more than one child.

Knowledge about FA of medical personnel

It was identified that 84.4% (356/422) of female medical personnel knew that FA could prevent birth defects. They were significantly more likely to know the fact if they

were younger ($P < 0.001$), had a college degree ($P < 0.001$), and were students, either medical or nurse ($P < 0.001$) (Table II). All of the 'no income' groups were students.

Of 422 female medical personnel, 169 (40.0%) knew that FA should be taken before pregnancy.

Discussion

Peri-conceptual FA supplementation is effective in preventing neural tube defects (Berry et al. 1999) and may have a preventive effect against other congenital defects (Hernandez-Diaz et al. 2000; Botto et al. 2004), including Down syndrome (Czeizel and Puho 2005), non-syndromic cleft lip with or without cleft palate (Czeizel et al. 1999; Shotelersuk et al. 2003; van Rooij et al. 2004), cardiovascular anomalies, limb deficiencies, urinary tract defects, omphalocele, and imperforate anus. The US Public Health Service 1992 recommended that all women of child-bearing age who were capable of becoming pregnant should consume 0.4 mg FA per day for the purpose of reducing their risk of having a pregnancy affected with spina bifida or other neural tube defects (Public Health Service. US. 1992). Public health organizations of many developed countries have followed the recommendation (Van Allen et al. 1993; Rasmussen et al. 1998). Education programs and other strategies have increased knowledge and use of folate among child-bearing-aged women in these countries (Sen et al. 2001; Amitai et al. 2004; Daltveit et al. 2004). Lack of policy in this topic in Thailand urged us to carry out this survey to assess knowledge and practice in Thai women of child-bearing age.

We found, from this study, that only 23.5% of Thai pregnant women knew that FA could prevent birth defects. Most of them were from privileged groups with higher education and income. Parity was not associated with the knowledge. In addition, the woman with a previous child with a neural tube defect did not know or use folate in her current pregnancy. These findings suggested that most pregnant women did not receive counseling of peri-conceptual FA use. When we looked at data regarding the percentage of pregnant women who knew that, in order to prevent neural tube defects, FA is needed to be consumed prior to pregnancy, we found that only 3.4% knew and 0.3% (one out of 383) reported to take it preconceptionally. However, this expectant mother did not have the accurate knowledge as she reported that vitamin C, vitamin A and calcium also helped prevent some congenital anomalies. These percentages of FA knowledge and use are among the lowest in reported studies around the world (Perlow 2001; Abdulrazzaq et al. 2003; Unusan 2004; Bener et al. 2006).

Eighty-four percent of medical personnel knew that FA could prevent some congenital defects. This knowledge was associated with being a student, either medical or nurse. However, of the 356 medical personnel who knew that FA could help prevent some congenital anomalies, only 169 knew the correct timing. The knowledge has been present in medical journals, medical textbooks, and included in curriculum of students in medical fields. However, it is relatively new to Thai people and has not been present in public. This may explain the findings that the knowledge is more widespread among students than medical professionals, and among medical personnel than pregnant women.

King Chulalongkorn Memorial Hospital is located in the heart of Bangkok and is a training institution for medical students of the Faculty of Medicine of Chulalongkorn University, which is the only university in Thailand that has been listed as one of the

World's top 100 biomedicine universities (http://www.thes.co.uk/statistics/international_comparisons/). We therefore believe that the percentages of pregnant women attending our antenatal clinic and our medical personnel who had the correct knowledge of FA should not be lower than those of the whole population. The finding that percentages of FA knowledge and use in this study population were among the lowest provided sufficient evidence for the health authorities to initiate a strategy promoting peri-conceptional FA use.

Educational campaigns to promote daily FA consumption are important in women of child-bearing age. Previous studies showed that such an education program or a national campaign could significantly increase awareness, correct knowledge, and use (Amitai et al. 2004). However, these campaigns could not be applied to unplanned pregnancies. We did not study the percentage of unplanned pregnancies in our expectant mothers, but estimated that one-half of them might be unplanned, similar to most of the previous studies (Morin et al. 2001; Oleary et al. 2001). Moreover, many previous reports showed that there was still low compliance with recommendations on FA use in relation to pregnancy. Therefore, food fortification with FA was recommended as a more effective strategy (Morin et al. 2001; Knudsen et al. 2004; Busby et al. 2005). This strategy would undoubtedly be able to help not only vulnerable groups, such as the less educated and the young, but also women with unplanned pregnancies. We have provided evidence that a comprehensive strategy should be initiated to reduce the incidence of these preventable congenital anomalies without delay.

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References

- Abdulrazzaq YM, Al-Gazali LI, Bener A, Hossein M, Verghese M, Dawodu A, Padmanabhan R. 2003. Folic acid awareness and intake survey in the United Arab Emirates. *Reprod Toxicol* 17:171–176.
- Alwan A, Modell B. 2003. Recommendations for introducing genetics services in developing countries. *Nat Rev Genet* 4:61–68.
- Amitai Y, Fisher N, Haringman M, Meiraz H, Baram N, Leventhal A. 2004. Increased awareness, knowledge and utilization of preconceptional folic acid in Israel following a national campaign. *Prev Med* 39:731–737.
- Bener A, Al Maadid MG, Al-Bast DA, Al-Marri S. 2006. Maternal knowledge, attitude and practice on folic acid intake among Arabian Qatari women. *Reprod Toxicol* 21:21–25.
- Berry RJ, Li Z, Erickson JD, Li S, Moore CA, Wang H, Mulinare J, Zhao P, Wong LY, Gindler J, et al. 1999. Prevention of neural-tube defects with folic acid in China. China–U.S. Collaborative Project for Neural Tube Defect Prevention. *N Engl J Med* 341:1485–1490.
- Botto LD, Olney RS, Erickson JD. 2004. Vitamin supplements and the risk for congenital anomalies other than neural tube defects. *Am J Med Genet C Semin Med Genet* 125:12–21.
- Busby A, Abramsky L, Dolk H, Armstrong B, Addor MC, Anneren G, Armstrong N, Baguette A, Barisic I, Berghold A, et al. 2005. Preventing neural tube defects in Europe: a missed opportunity. *Reprod Toxicol* 20:393–402.
- Czeizel AE, Puho E. 2005. Maternal use of nutritional supplements during the first month of pregnancy and decreased risk of Down's syndrome: case–control study. *Nutrition* 21:698–704; discussion 774.

- Czeizel AE, Timar L, Sarkozi A. 1999. Dose-dependent effect of folic acid on the prevention of orofacial clefts. *Pediatrics* 104:e66.
- Daltveit AK, Vollset SE, Lande B, Oien H. 2004. Changes in knowledge and attitudes of folate, and use of dietary supplements among women of reproductive age in Norway 1998–2000. *Scand J Public Health* 32:264–271.
- Hernandez-Diaz S, Werler MM, Walker AM, Mitchell AA. 2000. Folic acid antagonists during pregnancy and the risk of birth defects. *N Engl J Med* 343:1608–1614.
- Knudsen VK, Orozova-Bekkevold I, Rasmussen LB, Mikkelsen TB, Michaelsen KF, Olsen SF. 2004. Low compliance with recommendations on folic acid use in relation to pregnancy: is there a need for fortification? *Public Health Nutr* 7:843–850.
- Marques-de-Faria AP, Ferraz VE, Acosta AX, Brunoni D. 2004. Clinical genetics in developing countries: the case of Brazil. *Community Genet* 7:95–105.
- Morin VI, Mondor M, Wilson RD. 2001. Knowledge on periconceptual use of folic acid in women of British Columbia. *Fetal Diagn Ther* 16:111–115.
- Oleary M, Donnell RM, Johnson H. 2001. Folic acid and prevention of neural tube defects in 2000 improved awareness—low peri-conceptual uptake. *Ir Med J* 94:180–181.
- Perlow JH. 2001. Comparative use and knowledge of preconceptional folic acid among Spanish- and English-speaking patient populations in Phoenix and Yuma, Arizona. *Am J Obstet Gynecol* 184:1263–1266.
- Rasmussen LB, Andersen NL, Andersson G, Lange AP, Rasmussen K, Skak-Iversen L, Skovby F, Ovesen L. 1998. Folate and neural tube defects. Recommendations from a Danish working group. *Dan Med Bull* 45:213–217.
- Sen S, Manzoor A, Deviasumathy M, Newton C. 2001. Maternal knowledge, attitude and practice regarding folic acid intake during the periconceptual period. *Public Health Nutr* 4:909–912.
- Shotelersuk V, Ittiwut C, Siriwan P, Angspatt A. 2003. Maternal 677CT/1298AC genotype of the MTHFR gene as a risk factor for cleft lip. *J Med Genet* 40:e64.
- Unusan N. 2004. Assessment of Turkish women's knowledge concerning folic acid and prevention of birth defects. *Public Health Nutr* 7:851–855.
- Public Health Service. US. 1992. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. *MMWR Recomm Rep* 41:1–7.
- Van Allen MI, Fraser FC, Dallaire L, Allanson J, McLeod DR, Andermann E, Friedman JM. 1993. Recommendations on the use of folic acid supplementation to prevent the recurrence of neural tube defects. Clinical Teratology Committee, Canadian College of Medical Geneticists. *CMAJ* 149:1239–1243.
- van Rooij IA, Ocke MC, Straatman H, Zielhuis GA, Merkus HM, Steegers-Theunissen RP. 2004. Periconceptual folate intake by supplement and food reduces the risk of nonsyndromic cleft lip with or without cleft palate. *Prev Med* 39:689–694.