

AWARENESS AND USE OF FOLIC ACID AMONG PREGNANT WOMEN IN TAIPEI

Hei-Jen Jou^{1,2}, I-Ping Hsu³, Chieh-Yu Liu⁴, Shih-Hsien Chung⁵, Shih-Ming Chen¹, Meei-Ling Gau^{5*}

¹Department of Obstetrics and Gynecology, Taiwan Adventist Hospital, ²Department of Obstetrics and Gynecology, National Taiwan University Hospital, ³Health Education Resource Center, Bureau of Health Promotion, Department of Health, ⁴Department of Nursing, and ⁵Graduate Institute of Nurse-Midwifery, National Taipei College of Nursing, Taipei, Taiwan.

SUMMARY

Objective: Periconceptional use of folic acid may effectively reduce the risk of fetal neural tube defects. The objective of the present study was to evaluate the awareness and use of folic acid during periconceptional period in Taiwan.

Materials and Methods: A cross-sectional study was performed at Taiwan Adventist Hospital between March 2008 and December 2008. Data were obtained using a questionnaire from 275 women between 10–12 weeks of gestation.

Results: About 90% of women reported having ever heard of folic acid, but only 15.6% of women used folic acid before their pregnancy. There was no significant relationship between awareness and use of folic acid and variant sociodemographic factors. Only 41% of women (78/191) understood the recommended dose of folic acid. About 86% of women (170/197) reported they could identify natural folate-rich food and most of them stated green leaf vegetables as the most important natural source of folic acid.

Conclusion: Only a small proportion of women have used folic acid before their pregnancies. A public health policy or strategy to increase the preconceptional use of folic acid is needed in Taiwan. [*Taiwan J Obstet Gynecol* 2010;49(3):306–310]

Key Words: awareness, folic acid, pregnancy, supplementation

Introduction

Neural tube defects (NTDs) are the most common congenital malformations with a prevalence of 1.0–4.8 per 1,000 pregnancies in the Asian population [1]. NTDs include a wide spectrum of defects involving the central nervous system and range from the most severe form with anencephaly to sacral meningocele. Congenital malformations such as NTDs remain major challenges for antenatal diagnosis and postnatal care. Although anencephaly is fatal, most fetuses with spinal

bifida survive with handicaps to varying degrees and require medical and social support.

As the techniques and instruments for antenatal diagnosis become more advanced, most major congenital malformations such as NTDs can be detected antenatally. The Taiwan National Health Insurance (NHI) was implemented in 1995, and nearly 99% of Taiwan's population was covered by the NHI by 2005. The NHI provides antenatal ultrasound scanning at about 20 weeks of gestation for pregnant women. Therefore, the most severe form of NTDs can be detected around 20 weeks of gestation or even earlier.

In addition to the advances in antenatal diagnosis, NTDs are now preventable if women consume folic acid before pregnancy and early in pregnancy. Periconceptional intake of 400 µg folic acid can significantly reduce the risk of NTDs. Because most pregnancies are not planned, pregnant women may not take folic acid



ELSEVIER

*Correspondence to: Dr Meei-Ling Gau, Graduate Institute of Nurse-Midwifery, National Taipei College of Nursing, No. 365, Ming-Te Road, Peitou, Taipei 112, Taiwan.

E-mail: meeiling@ntcn.edu.tw

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periconceptionally. In 1998, the US Food and Drug Administration started the policy of folic acid fortification with a level of fortification to assist women of reproductive age to increase their folic acid intake by an average daily dose of 100 µg [2]. A decline by 31% in the prevalence of spina bifida and 16% in anencephaly NTDs was observed since introduction of the fortification policy [3].

Women of reproductive age in Taiwan do not get folic acid of the recommended dose from their daily food and the Taiwanese government has not established a policy of folic acid fortification. It is therefore warranted to understand the knowledge and attitude regarding folic acid in pregnant women. We conducted a cross-sectional study to survey the awareness and use of folic acid in pregnant women in Taiwan.

Materials and Methods

A cross-sectional study was conducted at a community hospital (Taiwan Adventist Hospital) in north Taiwan to investigate awareness, knowledge, and behavior of folic acid supplementation in pregnant women. The present study was approved by the Institutional Review Board of Taiwan Adventist Hospital. Subjects were recruited from the Departments of Obstetrics and Gynecology at the hospital. Written informed consent was obtained from every participant at the beginning of the study.

Data was collected by a well-trained research assistant at the beginning of the study for each subject including age, socioeconomic status, and anthropometric indices. Body mass index (BMI) was calculated using weight in kilograms divided by the square of the height in meters. The categories of preconceptional body weight were according to the definition from the Bureau of Health Promotion (Department of Health, Taiwan): a BMI < 18.5 is underweight, a BMI between 18.5–24 is normal, a BMI ≥ 24 is overweight and ≥ 27 is considered obese. A questionnaire for the knowledge, attitude, and behavior for folic acid supplementation was also obtained when women visited the institute for their first antenatal care was provided by NHI (usually between 10 and 12 weeks of gestation). The questions were:

- 1) Do you know of folic acid?
- 2) Do you have pre-conceptive folic acid supplementation?
- 3) Do you have post-conceptive folic acid supplementation?
- 4) Who suggested the supplementation?
- 5) If you have folate supplementation, do you know the dose you used?

- 6) Do you know of any folate-rich food and can you state one folate-rich food?

Descriptive analysis was used for analysis of socio-demographic characteristics of subjects, and results were expressed in terms of mean and standard deviations. Multivariate analysis was used to compare the results between the sociodemographic characteristics and awareness and use of folic acid. All statistical analyses were performed using SPSS version 15.0 (SPSS Inc., Chicago, IL, USA). A *p* value of < 0.05 was considered statistically significant.

Results

During the period between March 2008 and December 2008, a total of 275 pregnant women were recruited to the study. Written informed consent was obtained from every participant at the beginning of study. The mean age ± standard deviation of the subjects was 32.2 ± 3.6 years. Mean BMI ± standard deviation was 20.9 ± 2.5. Table 1 summarizes the basic characteristics of the subjects. About half of the women (46.7%) had a normal preconceptional BMI, 7.6% were obese, 36.0% were overweight, and 7.3% were underweight. Nearly 80.0% of women were employed and 62.2% were nulliparas.

Table 2 summarizes the knowledge and use of folic acid supplements in the pregnant women. Nearly 90% of the women reported that they had heard about folic acid; however, only 15.6% of the pregnant women used supplements containing folic acid before their pregnancy. The percentage of women that used folic acid rose to 70.9% early in pregnancy. The most common information source for usage of folic acid was the attending doctor (44.4%), followed by self-cognition (21.5%). Of the 191 women that answered the question regarding recommended dose of folic acid supplementation, only 78 (40.8%) answered they understood the recommended dose. About 86% of women (170/197) reported that they could identify natural foods rich in folic acid, and 107 women identified green leafy vegetable as the most important source of folic acid from natural foods.

Multivariate analysis of the relationship between the selected sociodemographic characteristics of the pregnant women and awareness and use of folic acid is summarized in Table 3. Results revealed that those who had heard of folic acid were not significantly associated with maternal age, education, employment, family income, and parity although women with higher family income and higher parity were more likely to have heard of folic acid. Also, there was no significant relationship between preconceptional use of folic acid

Table 1. Demographic characteristics of subjects (*n* = 275)

Variable	<i>n</i> (%)
Age (yr)*	
< 30	89 (32.4)
30–34	117 (42.5)
≥ 35	69 (25.1)
Preconceptional BMI [§]	
Underweight	20 (7.3)
Normal	131 (47.6)
Overweight	99 (36.0)
Obese	21 (7.6)
Missing data	4 (1.5)
Ethnic background	
Taiwanese	267 (97.1)
Mainland China	5 (1.8)
Others	2 (0.7)
Missing data	1 (0.4)
Education	
High school	107 (38.9)
University/college	125 (45.5)
Postgraduate	43 (15.6)
Employment	
Unemployed	57 (20.7)
Employed	218 (79.3)
Family income (NT\$)	
≤ 50,000	75 (27.3)
50,001–70,000	62 (22.5)
70,001–100,000	73 (26.5)
> 100,000	60 (21.8)
Missing data	5 (1.9)
Parity	
Nulliparas	171 (62.2)
Multiparas	104 (37.8)

BMI = body mass index.

and sociodemographic factors, and between folic use early in pregnancy and sociodemographic factors.

Discussion

The present survey on Taiwanese metropolitan women revealed that nearly 90% of women were aware of folic acid, but only 15.6% of women took supplements containing folic acid before their pregnancies. This rate of folic acid use rose to 70.9% early in the first trimester of pregnancy. This study explored an important area of public health regarding antenatal care in Taiwan.

NTDs are severe congenital anomalies involving the neural tube that develop by the 28th day of gestation. Periconceptional administration of folic acid can effectively reduce the risk of a woman to produce a fetus with NTDs with a decline by 85% in high-prevalence

Table 2. Knowledge and use of folic acid (*n* = 275)

Variable	<i>n</i> (%)
Ever heard about folic acid	
Yes	245 (89.1)
No	30 (10.9)
Intake folic acid before pregnancy	
Yes	43 (15.6)
No	232 (84.4)
Intake folic acid early in pregnancy	
Yes	195 (70.9)
No	80 (29.1)
Sources of information about folic acid	
Doctor	122 (44.4)
Nurse/pharmacist	13 (4.7)
Self-cognition	59 (21.5)
Family/others	40 (14.5)
Missing data	41 (14.9)
Knowledge for the dose of folic acid	
Understand	78 (28.4)
Not known	113 (41.1)
Missing data	84 (30.5)
Knowledge about food sources of folic acid	
Understand	170 (61.8)
Not known	28 (10.2)
Missing data	77 (28.0)
Which foods are rich in folic acid	
Green vegetables	107 (38.9)
Fruits	19 (6.9)
Liver	5 (1.8)
Meat	3 (1.1)
Missing data	141 (51.3)

and by 41% in low-prevalence areas [1]. Governmental policy plays an important role in consumption of folic acid in women at a reproductive age. Folic acid fortification is a cost-effective policy and provides a daily intake of folic acid with an average dose of 100 µg which can effectively reduce the prevalence of NTDs [2]. Most Asian countries such as Taiwan have not established a fortification policy. The prevention of NTDs mainly depends on the awareness and use of supplements containing folic acid as well as antenatal screening for NTDs.

The awareness of folic acid in women of a reproductive age has increased in recent years. A previous study revealed that only 55% of reproductive age women were aware of the term “folic acid” in 1995, and this rate increased to 80% in 2002 in the United States [2]. In Asian countries, the awareness ranges from 46.2% to 90.0% in recent years in reports from the United Arab Emirates, Arabian Qatari, Qatar and Oman, Thailand, and Israel [4–8]. Women living in an area of high NTDs prevalence usually had a low level of awareness and use of folic

Table 3. Multivariate analysis of the association between selected sociodemographic characteristics of the pregnant women and awareness and use of folic acid*

Sociodemographic characteristics	Ever heard of folic acid		Intake of folic acid			
	OR (95% CI)	<i>p</i>	Before pregnancy		Early in pregnancy	
			OR (95% CI)	<i>p</i>	OR (95% CI)	<i>p</i>
Age (yr)						
< 30	1.00		1.00		1.00	
30–34	0.46 (0.12–1.82)	0.27	2.13 (0.90–5.07)	0.18	1.08 (0.58–2.04)	0.80
≥ 35	1.27 (0.53–3.04)	0.59	1.99 (0.72–5.46)	0.09	0.84 (0.39–1.81)	0.65
Education						
High school	1.00		1.00		1.00	
University/college	1.71 (0.70–4.18)	0.93	0.92 (0.43–1.99)	0.84	0.83 (0.46–1.50)	0.53
Postgraduate	0.93 (0.22–3.98)	0.24	1.27 (0.46–3.52)	0.65	0.98 (0.42–2.29)	0.96
Employment						
Unemployed	1.00		1.00		1.00	
Employed	1.31 (0.45–3.80)	0.63	1.57 (0.62–3.94)	0.34	0.88 (0.45–1.73)	0.72
Family income (NT\$)						
≤ 50,000	1.00		1.00		1.00	
50,001–70,000	0.73 (0.26–2.09)	0.56	2.40 (0.96–6.03)	0.06	1.23 (0.58–2.58)	0.59
70,001–100,000	0.57 (0.19–1.67)	0.30	1.10 (0.39–2.85)	0.92	1.44 (0.68–3.02)	0.34
> 100,000	0.50 (0.14–1.86)	0.30	0.76 (0.24–2.38)	0.64	0.76 (0.32–1.79)	0.53
Parity						
Nulliparas	1.00		1.00		1.00	
Multiparas	0.50 (0.19–1.36)	0.18	0.99 (0.48–2.06)	0.99	1.05 (0.59–1.89)	0.87

*1.00 = reference group. OR = odds ratio; CI = confidence interval.

acid [9]. A national periconceptional folic acid campaign could significantly increase the awareness and utilization of folic acid in women of a reproductive age [8,10,11].

Previous studies revealed that Taiwanese women had a higher rate of folic acid intake during the periconceptional period compared to other Asian areas [5,9,12]. The present study showed a high level of awareness of folic acid but failed to reflect its successful use before pregnancy. A possible explanation for this gap between awareness and use of folic acid was that most pregnancies were unplanned or the pregnant women were unable to identify supplements containing folic acid. Most women in Taiwan received their first instance of antenatal care soon after pregnancy was confirmed, and the questionnaire was administered between 10–12 weeks of gestation. Pregnant women may learn about folic acid at their first visit for antenatal care which represents the high awareness rate. Although the present study did not indicate reasons for not taking folic acid before pregnancy, it explored an important issue regarding public health in Taiwan. It is warranted that a strategy or a government policy to increase preconceptional

use of folic acid in women of a reproductive age is instigated.

The most common source of information about folic acid was the attending doctors in the present study. These results are similar to those found in other studies [4,6]. The second most common source was self-cognition which did not clearly identify the real resource and may mostly come from the media. Although most women (107/134) could state leafy green vegetables as an important food source of folic acid, more than half of women did not know the recommended dose of folic acid supplementation. Health providers and the media need to provide more information on this issue for women.

Previous studies have demonstrated the association between various demographic factors and the awareness and use of folic acid in women of a reproductive age. Women with higher education knew more about folic acid and were more likely to use it [4,7]. Women living in rural areas and with less education knew less about folic acid and were less likely to use it [9]. However, none of the demographic factors in the present study exhibited a significant relationship with the awareness

of folic acid (Table 3). The present study also revealed that there was no significant relationship between periconceptional use of folic acid and age, education, employment, or parity of the subjects. Therefore, the data revealed that the awareness and use of folic acid in pregnant women was homogeneous in various sociodemographic categories. The results are quite different when compared with the experiences of other Asian countries. Possible explanations include that nearly all women were covered by NHI and received similar scheduled antenatal care, and most subjects came from communities near the institute. Women with different sociodemographic characteristics may have similar information sources.

In 2007, there were 55 registered newborn babies with defects of the nervous system and the registered number of neonates with inherited defects was 1,319 in 203,377 live births in Taiwan. The prevalence of defects of the nervous system was 0.027% [13], which was much less than previous reports in an ethnically identical population [1]. It was estimated that between 66–75% of the fetuses with NTDs were terminated after antenatal diagnosis. The cost-effectiveness of folic acid fortification could be challenged due to the small number of live births with NTDs. However, the antenatal diagnosis and termination due to such defects uses up medical resources and also results in a burden on the family. The fortification policy may result in a significant reduction in the number of elective terminations of fetuses due to NTDs [14].

Limitations of the present study mainly come from population bias. The database is from a single institute in the center of Taipei city and the case number is relatively small. In addition, not all subjects answered all the questions in the survey. However, this study may be the only one in the past 10 years, especially after the US Food and Drug Administration fortification policy, regarding knowledge and use of folic acid in pregnant women in Taiwan.

In conclusion, the present study revealed that less than 20% of women take folic acid in the Taiwan metropolitan area, let alone women in a rural area. To prevent NTDs, we need to emphasize the importance of increasing the preconceptional use of folic acid in women of a reproductive age. Also, we believe it is warranted to evaluate the cost-effectiveness for a folic acid fortification policy in Taiwan.

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