

USE OF FOLIC ACID AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE CLINIC AT AL-HEJRAH PRIMARY HEALTH CARE CENTER, MAKKAH AL-MOKARRAMAH, SAUDI ARABIA

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ABSTRACT

Background: In KSA, there was an apparent decline in the incidence of NTDs after the folic acid flour fortification. However, the incidence is still high, and usually associated with serious morbidity.

Aims & Objective: To assess the level of knowledge about folic acid supplements and its associated factors as well as to estimate the prevalence folic acid intake during first trimester of pregnancy among pregnant women attending antenatal care clinic at Al-Hejrah primary health care center, Makkah Al-Mokarramah, 2012.

Materials and Methods: It was a cross-sectional analytic study included a systematic random sample of pregnant women who attended Al-Hejrah primary health care center, Makkah at the time of conducting the study in 2012. An interview Arabic questionnaire to assess maternal knowledge and use of folic acid was prepared by the researcher and revised by supervisor. Validation during pilot study was assaulted. It consists of 17 questions covering 2 parts; socio demographic features and general knowledge of folic acid with its coexisting conditions.

Results: The study included 66 pregnant women. Their age ranged between 18 and 41 years with a mean of 29±6.7 years. All were Saudi. Among more than two-thirds of them (69.7%), physician was the source of information followed by internet (33.4%) and TV (19.7%). Almost two-thirds (65.2%) of participated pregnant women had sufficient knowledge about the importance of folic acid supplementation during pregnancy. Pregnant women who read about folic acid and those having more sources of information about importance of folic acid intake during pregnancy had sufficient knowledge about it. The majority of pregnant women had taken folic acid during pregnancy (81.8%).

Conclusion: The results of this study showed that the level of knowledge about folic acid and its importance during pregnancy among pregnant women attended Al-Hejrah primary health care center are satisfactory. However, additional measures directed at understanding folic acid usefulness and promoting folic acid awareness and consumption among all non-pregnant Saudi women of childbearing age are warranted.

Key Words: Folic Acid; Neurotubal Defects; Primary Health Care; Saudi Arabia

Introduction

Pregnant women should have a diet that consists of a variety of foods including proteins, carbohydrates, vitamins, minerals and fats. A balanced diet is the best way to receive nutrients, but vitamin supplements can also be beneficial. Pregnant women should only take vitamin supplements on a health care provider's recommendation. Supplements do not replace a healthy diet but rather ensure that a woman is receiving enough daily nutrients. Vitamin supplements work best when taken as part of a healthy diet and not as a substitute for a healthy diet.^[1] A review has been conducted by De-Regil, et al. Its main focus was on the provision of folate as folic acid or 5-MTHF (with or without other vitamins and minerals) in the periconceptional period (prior to conception and in early pregnancy, before 12 weeks' gestation) to reduce the first and second time occurrence of neural tube defects (NTDs) and other birth defects.^[2]

Folic Acid is a B vitamin, which is found in various foods

but can be best obtained through a multi-vitamin. Things such as leafy green vegetables, fortified cereals, orange juice and strawberries are just some of the many foods that contain folic acid. These foods alone may not contain the entire recommended daily allowance of 400 mcg, since some of the folate can be reduced through cooking it.^[3] Congenital anomalies affect an estimated 3% of newborns worldwide. Nearly 50 years ago, it was found that the B-vitamin folic acid play a role in promoting normal embryonic development.^[4] It was advised as a general guideline that all females of childbearing age take a supplement of 0.4 mg folic acid to reduce the risk of congenital malformations, including neural tube defects (NTD).^[5] Periconceptional supplementation with folic acid (before conception and during the first 12 weeks of pregnancy) was found to decrease the risk of NTD by 50–70 %,while also protecting from other birth defects such as those of the heart, limbs, urinary tract, cleft lip and palate, as well as other major structural abnormalities.^[6,7] Over the last 2 decades, folic acid food fortification was adopted by many countries, including

the Kingdom of Saudi Arabia.^[8-11] In KSA, there was an apparent decline in the incidence of NTDs after the folic acid flour fortification.^[11] However, the incidence is still high, and usually associated with serious morbidity.^[11-14] This emphasizes the need for innovative programs to increase folic acid consumption by women of childbearing age, to further reduce NTDs.

Primary care centers serves large numbers of women in childbearing age that should begin to take this vitamin before they even think about becoming pregnant, since 50% of all pregnancies are unplanned. A pregnant woman needs extra folic acid to help her to produce the additional blood cells she needs. Folic acid is crucial also to support the rapid growth of the placenta and fetus. This vitamin is needed to produce new DNA as cells multiply. Without adequate amounts of folic acid, cell division could be impaired, possibly leading to poor growth in the fetus or placenta, women who were more deficient in folic acid were more likely to have a baby who was premature and of low birth weight and low levels of folate may be a risk factor for repeated early miscarriages. Since these birth defects develop before a woman may even know she is pregnant (by the 28th day after conception) folic acid is only effective if taken before pregnancy and in the first few weeks of pregnancy. Folic acid is a single element that known to reduce approximately 70% of all neural tube birth defects (NTDs), which are a group of birth defects known as central nervous system defects that, involve abnormalities in the formation of the skull, brain, spine or spinal cord. Three to four percent of all babies born have significant abnormalities. Birth defects (congenital anomalies) are the leading cause of death in babies under one year of age. NTDs are the second most common type of birth defect, after congenital heart defects.^[3]

The current study aimed to assess the level of knowledge about folic acid supplements and its associated factors as well as to estimate the prevalence folic acid intake during first trimester of pregnancy among pregnant women attending antenatal care clinic at Al-Hejrah primary health care center, Makkah Al-Mokarramah, 2012.

Materials and Methods

A cross-sectional (analytical) primary health care based study was adopted among pregnant women who attended Al-Hejrah primary health care center, Makkah, Saudi Arabia, at the time of conducting study in 2012. Makkah is one of the important and relatively populated

cities in the Kingdom of Saudi Arabia. Makkah city is the place which captures the hearts of a billion Moslems all over the globe. It is located in the western region of the kingdom of Saudi Arabia. The catchment area was Al-Hejrah primary health care center which located in west sector of this city.

The total number of the pregnant women that visits Al-Hejrah primary center is 200 pregnant women. To obtain the largest sample size, maternal knowledge about folic acid supplement was as assumed to be 50%. Setting the confidence level to 95% and sample error of 10%, using the Epi Info program, the sample size calculated was 66 pregnant women. A systematic random sampling technique was applied to select women (every 3rd).

The dependent variables were maternal use of folic acid, maternal knowledge of folic acid and the independent variables were age, nationality, income, type of house, number of children, occupation, education level and sources of information about folic acid.

An interview questionnaire was utilized to assess maternal knowledge and use of folic acid. It was prepared by the researcher and revised by 3 consultants. Its validation during pilot study was assaulted. The questionnaire was designed in Arabic language with a cover letter to clarify the objectives of the study and the assurance of confidentiality. It consists of 17 questions covering 2 parts; socio demographic features and general knowledge of folic acid with its coexisting conditions.

The researcher visited the primary care center for interviewing pregnant women after getting approval from the Ministry of health and, primary care directors and pregnant women. The researcher interviewed all the pregnant and filled a questionnaire over 1 month period. Each questionnaire took 3 to 5 minutes to be filled.

Statistical Package for Social Sciences (SPSS) software version 16.0 was used for data entry and analysis. Descriptive statistics (e.g. number, percentage, range, standard deviation, arithmetic mean) and analytic statistics using Chi Square tests (χ^2) to test for the association and/or the difference between two categorical variables were applied. P-value equal or less than 0.05 was considered statistically significant. Pregnant women's knowledge score about folic acid was calculated as follow; the participated pregnant women were asked to respond to questions regarding folic acid definition, its nutritional sources, its deficiency impact on

pregnancy and timing of its supplementation during pregnancy. Right answer was given a score of 1 while wrong answer was given a score of 0. The overall score was calculated in the way that the higher the score, the higher the knowledge level and vice versa. The median value of the overall score was utilized as a cut-off point for knowledge categorization. Pregnant women were classified as having sufficient knowledge about folic acid, if they have overall score ≥ 4 and as having insufficient knowledge if they have a score < 4 .

Results

The study included 66 pregnant women. Table 1 presents their socio-demographic characteristics. Their age ranged between 18 and 41 years with a mean of 29 years and standard deviation of 6.7 years. All participants were Saudi. Almost two-thirds of them (65.1%) were at least university graduated. Slightly more than one-third of the participants (36.4%) were out-door workers.

As illustrated in figure 1, almost one quarter of the pregnant women (24.2%) claimed that they had enough information about importance of folic acid during their study years. Only 4.5% of them attended conferences about importance of folic acid intake during pregnancy (Figure 2).

As obvious from figure 3, the majority of the pregnant women (86.4%) have heard of or reading about the importance of folic acid supplementation during pregnancy. Figure 4 displays the sources of information about folic acid among participants. Among more than two-thirds of them (69.7%), physician was the source of information followed by internet (33.4%) and TV (19.7%). Nine women (13.6%) reported that they have no any information about folic acid.

As seen in table 2, only 6 women (9.1%) knew that folic acid is one type of vitamin B. At least half of the participants knew that green vegetables (71.2%), pepper (63.6%) and orange (50%) are nutritional sources of folic acid while strawberry, yoghurt and bran were recognized by 42.4%, 36.4% and 34.8% of them, respectively as nutritional sources of folic acid. Most of the participants (71.2%) knew properly that folic acid deficiency during pregnancy leads to neural tube defect (spina bifida) and also they know the proper time for folic acid intake before and during the first trimester of pregnancy (72.7%).

Table-1: Socio-demographic characteristics of the participants

Socio-demographic data	Frequency	Percentage	
Age in years	18-25	23	34.8
	26-35	30	45.5
	>35	13	19.7
	Range	18-41	
	Mean \pm SD	29 \pm 6.7	
Nationality	Saudi	66	100
	Non-Saudi	0	0
Educational level	< university	23	34.8
	University	40	60.6
	Post-graduate	3	4.5
Job status	Out-door working	24	36.4
	House-wife	42	63.6

Table-2: Knowledge of the pregnant women attended Al-Hejra PHCC, Makkah about folic acid

Question	Right answer	N	%
What is folic acid?	One type of vitamin B	6	9.1
What are the nutritional sources of folic acid?	Strawberry	28	42.4
	Orange	33	50
	Pepper	42	63.6
	Bran	23	34.8
	Yoghurt	24	36.4
What is the result of folic acid deficiency during pregnancy?	Green vegetables	47	71.2
	Spina bifida	47	71.2
When folic acid should be taken?	Before and during the first trimester of pregnancy	48	72.7

Table-3: Factors associated with knowledge of pregnant women about folic acid importance during pregnancy

Characteristics	Folic acid knowledge		χ^2 -value	p-value	
	Sufficient No. (%)	Insufficient No. (%)			
Age in years	18-25 (n=23)	13 (56.5)	10 (43.5)	1.16	0.56
	26-35 (n=30)	21 (70.0)	9 (30.0)		
	>35 (n=13)	9 (69.2)	4 (30.8)		
Job Status	Working (n=24)	17 (70.8)	7 (29.2)	0.54	0.324
	House wives (n=42)	26 (61.9)	16 (38.1)		
Educational Level	< university (n=23)	12 (52.2)	11 (47.8)	2.62	0.174
	\geq university (n=43)	31(72.1)	12 (27.9)		
Enough information during study years	Yes (n=16)	7 (43.8)	9 (56.2)	4.26	0.041
	No (n=50)	36 (72.0)	14 (28.0)		
Attending conferences	Yes (n=3)	2 (66.7)	1 (33.3)	0.03	0.724
	No (n=63)	41 (65.1)	22 (34.9)		
Reading about folic acid	Yes (n=57)	42 (73.7)	15 (26.3)	13.4	0.001
	No (n=9)	1 (11.1)	8 (88.9)		
Number of sources of information	No (n=9)	1 (11.1)	8 (88.9)	16.54	0.001
	One (n=34)	22 (64.7)	12 (35.3)		
	Two (n=12)	10 (83.3)	2 (16.7)		
	\geq two (n=11)	10 (90.9)	1 (9.1)		

From figure 5, almost two-thirds (65.2%) of participated pregnant women had sufficient knowledge about the importance of folic acid supplementation during pregnancy.

Table 3 shows that most of pregnant women (73.7%) who read about folic acid and its importance during pregnancy had sufficient knowledge about it compared to only 11.1% of those who didn't read about it.

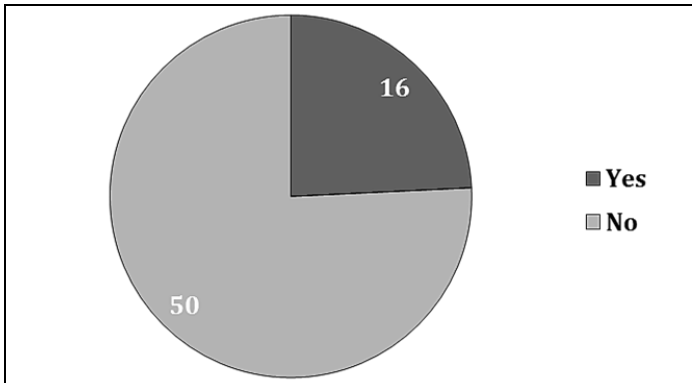


Figure-1: History of having enough information regarding folic acid importance during study years

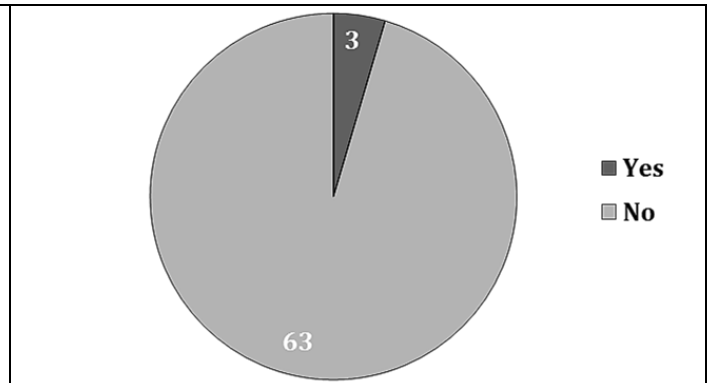


Figure-2: History of attending conference regarding folic acid importance during pregnancy

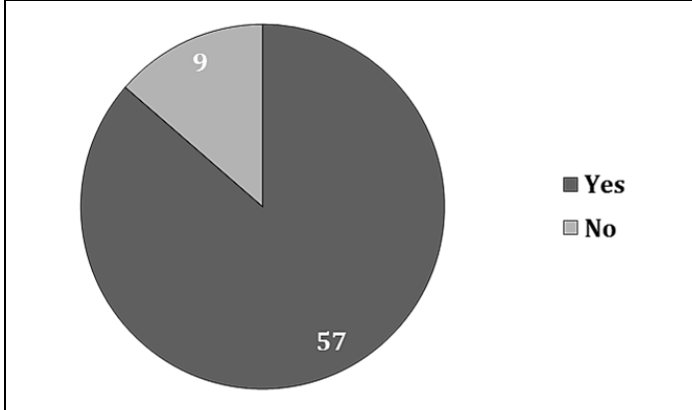


Figure-3: History of reading or hearing about folic acid importance during pre-conception period

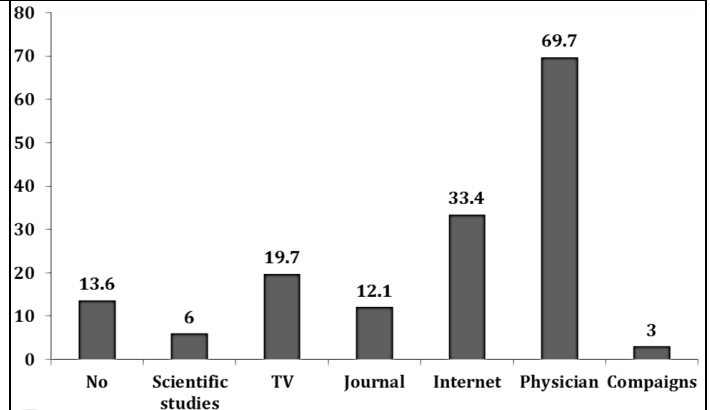


Figure-4: Source of information about folic acid importance during pregnancy

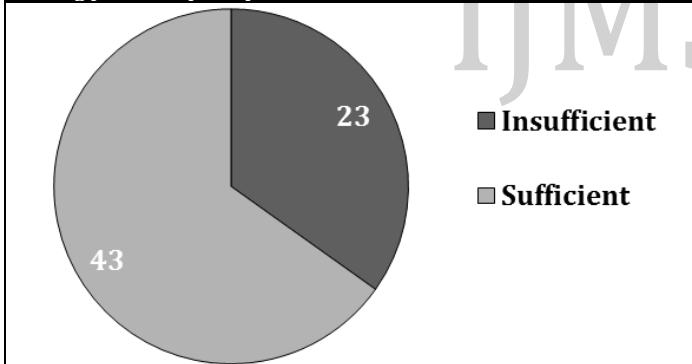
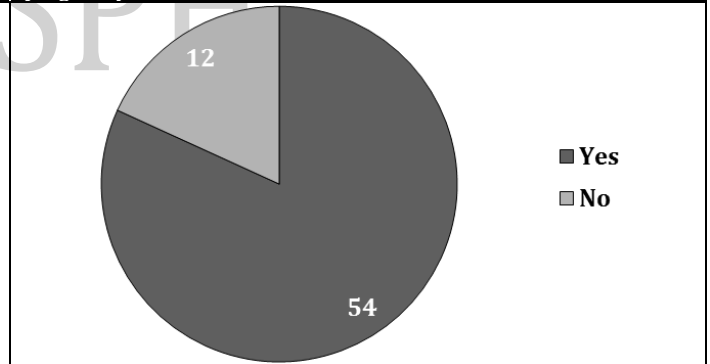


Figure-5: Distribution of the participated pregnant women according to their knowledge about folic acid



This difference was statistically significant, $p=0.001$. Contrary to that, 43.8% of pregnant women who claimed that they had enough information about folic acid during study years had sufficient knowledge about it compared to 72% of those reported that they had no enough information about folic acid during study years. This difference was statistically significant, $p=0.041$. Having more sources of information about importance of folic acid intake during pregnancy was significantly associated with sufficient knowledge about it as the majority (90.9%) of pregnant women who had more than two sources of information compared to 11.1% and 64.7% of those who had no source or one source of

information, respectively had sufficient knowledge about folic acid. This difference was statistically significant, $p=0.001$. Age, job status, educational level and attending conferences about folic acid were not significantly associated with the folic acid knowledge of the participants.

As shown in figure 6, the majority of pregnant women had taken folic acid during pregnancy (81.8%). Table 4 shows that the majority of university or above educated pregnant women (93.0%) compared to 60.9% of lower educated women had taken folic acid during pregnancy. This difference was statistically significant, $p=0.002$. All

pregnant women who claimed that they had enough information about folic acid during study years had taken folic acid during pregnancy compared to 76.0% of those reported that they had no enough information about folic acid during study years. This difference was statistically significant, $p=0.025$. The majority of pregnant women (87.7%) who read about folic acid compared to 44.4% of those who did not read about it had taken folic acid during pregnancy. This difference was statistically significant, $p=0.007$. Having more sources of information about importance of folic acid intake during pregnancy was significantly associated with folic acid intake during pregnancy as all of pregnant women who had more than two sources of information compared to 44.4% and 82.4% of those who had no source or one source of information, respectively had taken folic acid. This difference was statistically significant, $p=0.009$. Age, job status and attending conferences about folic acid were not significantly associated with folic acid intake during pregnancy.

Table-4: Factors associated with taking folic acid intake during pregnancy among pregnant women

Characteristics	Folic acid intake		χ^2 -value	p-value	
	Yes No. (%)	No No. (%)			
Age in years	18-25 (n=23)	19 (82.6)	4 (17.4)	0.27	0.876
	26-35 (n=30)	25 (83.3)	5 (16.7)		
	>35 (n=13)	10 (76.9)	3 (23.1)		
Job Status	Working (n=24)	22 (91.7)	2 (8.3)	2.46	0.106
	House wives (n=42)	32 (76.2)	10 (23.8)		
Educational Level	< university (n=23)	14 (60.9)	9 (39.1)	10.41	0.002
	≥ university (n=43)	40 (93.0)	3 (7.0)		
Enough information during study years	Yes (n=16)	16 (100.0)	0 (0.0)	4.69	0.025
	No (n=50)	38 (76.0)	12 (24.0)		
Attending conferences	Yes (n=3)	3 (100.0)	0 (0.0)	0.69	0.542
	No (n=63)	51 (81.0)	12 (19.0)		
Reading about folic acid	Yes (n=57)	50 (87.7)	7 (12.3)	9.79	0.007
	No (n=9)	4 (44.4)	5 (55.6)		
Number of sources of information	No (n=9)	4 (44.4)	5 (55.6)	11.68	0.009
	One (n=34)	28 (82.4)	6 (17.6)		
	Two (n=12)	11 (91.7)	1 (8.3)		
	≥ two (n=11)	11 (100.0)	0 (0.0)		

Table-5: Believes of the pregnant women attended Al-Hejra PHCC, Makkah about folic acid

Statements	Response	N	%
Unplanned pregnancy is the reason for not taking folic acid.	Yes	15	22.7
	No	51	77.3
Economic status affects not taking folic acid during pregnancy.	Yes	3	4.5
	No	63	95.5
Neonatal congenital anomalies are mainly due to not taking folic acid during pregnancy	Yes	9	13.6
	No	57	86.4
Main reasons for neonatal congenital anomalies are:	Consanguinity	54	81.5
	Drug intake during pregnancy	57	86.4
	Radiation exposure	56	84.8

As illustrated in table 5, 22.7% of the pregnant women

believed that unplanned pregnancy is the reason for not taking folic acid during pregnancy. Only three pregnant women (4.5%) believed that economic status affects not taking folic acid during pregnancy. Nine pregnant women (13.6%) believed that neonatal congenital anomalies are mainly due to not taking folic acid during pregnancy while the majority of them believed that drug intake during pregnancy (86.4%), exposure to radiation (84.8%) and consanguinity (81.5%) are the main reasons for neonatal congenital anomalies.

Discussion

Educational strategies on the importance of folic acid supplementation among women are particularly important in the Kingdom of Saudi Arabia, as the incidence of NTDs is still high despite the recent fortification of flour.^[11]

Our results showed that a high percentage of pregnant women (71.2%) were aware about the importance of folic acid in preventing neural tube defects (NTDs). This is higher than what has been reported from Qatar, as only 14% of Arabic Qatar women knew that folic acid could prevent birth defects. However, 53.7% of them reported that they heard of foliate, and 41.3% of educated women knew more about folic acid, and used it more often in the periconceptional and first trimester period.^[15] Similarly, a survey of United States women of childbearing age found that only 13% knew that folic acid can prevent NTDs.^[16] A more worse result has been reported in another study done to determine the level of folic acid awareness among female college students in Jeddah, Saudi Arabia in 2008, showed that a high percentage of educated women (88%) were not aware on the importance of folic acid in preventing NTDs.^[14] In contrast to these results, a high level of awareness of this important public health message (93.9%) has been reported among student pharmacists in USA.^[17]

In the current study, 72.2% of pregnant women were aware of the proper timing of folic acid intake (in the periconceptional period and first trimester). This high rate could be attributed to the fact that almost two-thirds of pregnant women were at least university graduated. Although, a higher percentage of highly educated women had sufficient knowledge compared to those less educated, yet this was not statistically significant (most probably due to relatively small size in our study).

It is interesting that Canfield et al from Texas, USA reported the need for educational strategies in Texas to

target Hispanic women at high risk of NTDs, especially those who primarily speak Spanish.^[18] Similarly, Frensh, et al from Canada reported that most of women (95%) in her study had heard of folic acid, but only 25% knew that it could prevent birth defects.^[19] However, the most common sources of their information were magazines/newspapers, and television/radio. In Qatari study, the most common information sources on folate were physicians (63.4%), and newspapers/magazines/books (21.7%).^[15] In our cohort, the source was mainly from physicians and internet. This is could be attributed to the fact that our study included a higher percentage of university educated women rather than general population.

The data obtained from the 1999 North Carolina PRAMS survey showed that knowledge of folic acid was highest among women ages more than 25 years and lowest among women under 20 years old.^[20] The same has been reported in the current study as 70% of pregnant women aged between 26 and 35 years sufficient knowledge about the importance of folic acid supplementation in delivering healthy baby as compared to only 56.5% of those less than 26years of age. However, due to small sample size, this was not significant.

In the current study, awareness of folic acid importance increased with some socioeconomic indicators although not significant (again due to relatively small sample size) as higher educational level and working. This high level of folic acid awareness among some sociodemographic groups was encouraging, and suggests that folic acid education efforts may be beginning to make a difference among some women, mostly from populations that are more affluent. However, this study demonstrated a pattern of low folic acid awareness among socioeconomically disadvantaged groups. There is a great need to intensify folic acid education programs with a focus toward disadvantaged groups. Lack of awareness on the importance of folic acid, was the most common reason given in the Canadian study, for choosing not to use folic acid supplements before pregnancy.^[19] The level of awareness was much better in Australia (62.3%), although they reported that health promotion strategies have not reached all segments of the target population equally.^[21]

In the present work, the knowledge of folic acid importance during pregnancy was lower among those who claimed that they had enough information regarding this issue during their study years. This indicates suboptimal quality of information about folic acid during

study years that necessitate reconsideration.

In our research, most of pregnant women (81.8%) had taken folic acid supplementation during pregnancy. This is a direct reflection of sufficient knowledge about folic acid (65.2%) as well as high educational level of the participants.

The relatively low rate of knowledge concerning foodstuffs rich in folic acid reported among our cohort (34.8%-71.2% were aware of the foodstuffs rich in folate) could reflect the lack of a formal nutrition course as a part of their professional curriculum. The same has been reported in another study conducted on student pharmacists in USA.^[17] The lack of certain specific knowledge concerning folic acid and prevention of NTDs in the American study was easily rectified. After participating in a short nutrition course, the same survey questions were readministered to the same student pharmacists. At that time, the proportion of student pharmacists who knew that folic acid could prevent NTDs was found to have increased significantly compared with before participation in the course. Significantly, increased proportions of student pharmacists also knew when and how much of this vitamin is needed for optimal protection from NTDs, and could correctly identify sources of folic acid. Providing increased education concerning folic acid and prevention of NTDs to university female students, may, therefore, represent one potential mechanism to increase awareness of this important public health message and increase consumption of folic acid by women of reproductive age.

Our study has a limitation, as it was carried on pregnant women at only one PHCC. The relatively small sample size does not allow proper coverage of different social classes.

Conclusion

Medical and public health professionals have an obligation to prevent disease that is readily preventable. With regard to folic acid-preventable birth defects, that obligation has not yet been met. Until that time comes, the health and wellbeing of our children and their families will continue to be unnecessarily compromised.

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