

Original Research Article

Knowledge and practice of folic acid supplementation and impact of income level on awareness among women of child-bearing age in Saudi Arabia

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Abstract

Purpose: To investigate the knowledge of Saudi women (pregnant and non-pregnant) about the significance of folic acid (FA) supplementation and to determine how income levels affects this knowledge and its implementation.

Methods: The study was conducted among women of child-bearing age attending Al-Hada Armed Forces Hospital and Khaliss General Hospital (both in Riyadh, Saudi Arabia) for pregnant women and Omm Al-Qura University in Makkah Governorate (Saudi Arabia) for non-pregnant women. A structured questionnaire was used to collect socio-demographic data and to analyze levels of FA knowledge, including general awareness, proper timing of its use, information source, FA benefits, and the perils of FA deficiency. A chi-square test was performed to test the differences between variables.

Results: Analysis of the survey data revealed that 81.1 % of non-pregnant and 91.1 % of pregnant women were aware of the term, FA ($p < 0.05$). Moreover, 71.1 % of the pregnant compared to 35.6% of non-pregnant women knew that this supplement must be taken before becoming pregnant and this difference was statistically significant ($p < 0.05$). For pregnant women, doctors and previous pregnancies were the main sources of FA knowledge, while mass media was the most frequently reported source for non-pregnant women ($p < 0.05$). Income level was not associated with FA knowledge in either group.

Conclusions: This study illustrates a deficiency in the knowledge and consumption of this important micronutrient in women of childbearing age, the population most in need of this information. Nutrition education should be provided to increase the understanding and practice of FA supplementation preconceptionally and during pregnancy.

Keywords: Folic acid supplementation, Pregnancy, Neural tube defect, Income level, Food fortification

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INTRODUCTION

The nutritional status of women during pregnancy is very important, not just for the quality of their own lives, but also for the

wellbeing of their children. Vitamins and minerals support maternal, placental, and fetal metabolic needs and enable healthy gestation. Pregnancy represents a period full of both physical and emotional changes and, as such, the health

and wellbeing of expectant mothers require extra attention. A well-balanced diet is of utmost importance during this period, particularly because the fetus is nurtured directly through the placenta and, therefore, the fetus' nutritional status is entirely dependent upon that of the mother [1]. Consequently, adequate maternal nutrition is indispensable during pregnancy to ensure both maternal and fetal health [2]. Folic acid (FA), also referred to as vitamin B9, plays a crucial role in various vital functions including DNA synthesis, methylation and repair, and also serves as a cofactor in numerous biological reactions [3].

Surprisingly, FA intake has remained low [4] despite ample evidence that its consumption preconceptionally and during first trimester of pregnancy significantly decreases the possibility of neural tube defects (NTDs) [5], which lead to congenital malformations including spina bifida and anencephaly [6]. Studies have also revealed that drug therapy is more effective than a balanced diet toward reducing the incidence of NTDs [7,8]. The outcome for fetuses affected with NTDs is bleak: if they are not aborted and manage to survive the neonatal period, they are sure to suffer from life-long disabilities [9]. Maternal consumption of FA before and during the first trimester of pregnancy reduces the risk of NTDs by 50 – 80% [10]. Furthermore, FA also prevents congenital heart defects, growth retardation (e.g., low birth weight, smaller head and chest circumferences), preterm births, and cleft palates [11].

Health regulators' recommend at least 400 µg of FA per day preconceptionally and in the first trimester (12 weeks) [12]. While both FA and folate are water soluble, FA is a purely synthetic product while folate occurs naturally in food. Like many countries, the Kingdom of Saudi Arabia uses flour fortified with FA, which in turn reduced the incidence of NTDs [13]. The objective of this study was to investigate the cognizance among Saudi women (both pregnant and non-pregnant) of the significance of FA supplementation during pregnancy, the rate of FA consumption, and the effect of income level on these beliefs and practices.

METHODS

Study design

A descriptive cross-sectional approach was used to assess the cognizance regarding the significance of FA supplementation among reproductive women. One hundred ten non-pregnant women and one hundred pregnant

women were interviewed randomly of which 180 were selected (90 pregnant and 90 non-pregnant) for inclusion in this study. Pregnant women were selected from clinics of Obstetrics Department at (Al-Hada Armed Forces Hospital and Khaliss General Hospital in Riyadh) while non-pregnant women were mostly students and staff of the Omm Al-Qura University in Makkah Governorate.

Inclusion criteria

All women of reproductive age were eligible for inclusion in this study.

Exclusion criteria

Women under than 18 years of age, with chronic disease, and active smokers were barred from participation in the present study.

Data collection

The subjects were interviewed using a structured questionnaire designed by the research team and questionnaire was filled with consent of subjects. This research received approval from Ethical Committee of Department of Applied Medical Sciences, Umm Al Qura University (no. 2017-11-CN01) and followed the guidelines of World Medical Association Declaration of Helsinki of 1964, as amended in 1996 [14]. Oral and written consent was obtained from each participant and they were assured of the confidentiality of the information given by them. The first segment of the survey involved socio-demographic information and the second segment assessed knowledge about FA, including general awareness, the proper timing of its use, the source of their information, the benefits of FA supplementation, and the perils of its deficiency. The answers to these questions were coded as either right or wrong.

Data analysis

The data are presented as frequencies and percentages. A chi-square test was used to identify relevant differences between variables using the Statistical Package for Social Sciences package for Windows. *P*-values ≤ 0.05 were regarded as statistically significant.

RESULTS

Socio-demographic characteristics

Table 1 presents the socio-demographic characteristics of the subjects. The majority (n = 83, 92.2 %) of non-pregnant women were 18 - 24

years old while only 29 (32.2 %) of the pregnant women were 18 - 24 years old and 29 (32.2 %) of the pregnant women were 25 - 31 years old. Only 8 (8.90 %) pregnant women were over 39 years of age. Most of the non- non-pregnant (n = 87, 96.7 %) women were college graduates while only 46 (51.1 %) pregnant women had college degrees. Pregnant women had higher incomes than non-pregnant women. These differences between two groups in terms of age, income level, and education were statistically significant ($p < 0.05$).

Awareness and use of folic acid

Table 2 shows the awareness of FA in the two groups. The majority of the subjects did not know whether FA is a vitamin, mineral, or protein. Additionally, most were unaware of its dietary sources across both groups. Only 36 (40 %) non-pregnant women and 54 (60 %) pregnant women ($p > 0.05$) were cognizant of the significance of FA supplement. The majority of the women did not know that FA deficiency affects the fetus too, rather than just the mother. This difference was statistically significant ($p < 0.05$) between the two groups. Pregnant women answered more questions correctly than their non-pregnant counterparts.

Table 3 contains the sources of information and awareness concerning the time of FA use according to study group. Awareness of FA was higher in pregnant (n = 82, 91.1 %) than in non-pregnant women (n = 73, 81.1 %) though this

difference did not reach statistical significance ($p > 0.05$). More pregnant women (n = 68, 75.6 %) consumed FA-rich food than non-pregnant women (n = 5, 5.6 %). Similarly, compared to non-pregnant women (n = 32, 35.6 %), a higher percentage of pregnant women (n = 64, 71.1 %) were aware of the appropriate time to begin FA supplementation. This difference was statistically significant ($p < 0.05$), as was the difference in the information sources between the two groups. Doctors and previous experience represented the chief source of information for pregnant women and mass media was the main source of the information reported by non-pregnant women.

Table 4 illustrates the cognizance and use of FA supplements among expecting women during their pregnancy. Although 79 (87.8 %) pregnant women consumed supplemental FA during their pregnancy, only 8 (8.9 %) of these had accurate information about its recommended dose. Furthermore, the majority of pregnant women (n = 64, 71.11 %) had initiated FA supplementation prior to conception.

Association between income level and sources of information and awareness among study participants

From the data presented in Table 5, it is clear that income level and sources of information (doctors, nurses, previous experiences, books, mass media, etc.) did not affect FA awareness in either pregnant or non-pregnant women.

Table 1: Socio-demographic characteristics of study participants

Variable	Non-pregnant women (n=90)		Pregnant women (n=90)		Chi square	P-value*
	N	%	N	%		
Age (years)						
18-24	83	(92.2)	29	(32.2)	7.42	0.012
25-31	6	(6.7)	29	(32.2)		
32-38	1	(1.1)	24	(26.7)		
39-45	0	(0)	8	(8.90)		
Level of education						
Illiterate	0	(0)	3	(3.3)	48.668	0.001
Primary	0	(0)	3	(3.3)		
Intermediate	0	(0)	6	(6.7)		
Secondary	3	(3.3)	32	(35.6)		
University	87	(96.7)	46	(51.1)		
Income/month (USD)						
≤800	50	(55.5)	13	(14.4)	35.0	0.005
800-1600	11	(12.2)	30	(33.3)		
1600-2100	12	(13.3)	22	(24.4)		
>2100	17	(6.7)	25	(27.8)		

* $p \leq 0.05$; N = number

Table 2: Women correctly answering questions on awareness of folic acid use

Variable	Non-pregnant (n=90)	Pregnant (n=90)	Chi square	p-value
What is folic acid?	21 (23.3%)	33 (36.7)	3.81	0.051
What is the main source of folic acid?	31 (34.4)	33 (36.7)	0.97	0.755
Do you think folic acid supplementation is required?	36 (40)	54 (60)	7.20	0.007
What is importance of folic acid during pregnancy?	41 (45.6)	64 (71.1)	12.09	0.001
Who suffers from folic acid deficiency?	30 (33.3)	45 (50)	5.14	0.023

Values in parentheses are percentages

Table 3: Sources of information and awareness about time of use of folic acid among study participants

Variable	Non-pregnant women (n=90)		Pregnant women (n=90)		Chi square	P-value*
	N	%	N	%		
Have you heard about folic acid?						
A. Yes	73	(81.1)	82	(91.1)	3.763	0.052
B. No	17	(18.9)	8	(8.9)		
Do you eat folic acid rich food?						
A. Yes	5	(5.6)	68	(75.6)	12.59	0.00
B. No	85	(94.4)	22	(24.4)		
Do you know the proper time for using folic acid supplement?						
A. Before conception	32	(35.6)	64	(71.1)	22.86	0.00
B. After conception	58	(64.4)	26	(28.9)		
What is your main source of knowledge about folic acid?						
A. Doctor	11	(12.2)	49	(54.4)	52.11	0.00
B. Nutritionist	10	(11.1)	5	(5.6)		
C. Nurse	17	(18.9)	1	(1.1)		
D. Books and Magazines	9	(10)	2	(2.2)		
E. Previous experiences	0	(0)	15	(16.7)		
F. Mass media	31	(34.4)	5	(5.5)		
G. Friends and Relatives	12	(13.3)	13	(14.4)		

*Significant at $P \leq 0.05$; N-number

Table 4: Awareness and periconceptional use of FA supplement by pregnant women during pregnancy

Variable	N	%	Chi square	P-value*
Are you using folic acid supplement during pregnancy?				
A. Yes	79	(87.8)	14.23	0.000
B. No	11	(12.2)		
Did you start folic acid supplementation before conception?				
A. Yes	64	(71.11)	22.8	0.000
B. No	26	(28.89)		
Are you aware of recommended dose of folic acid?				
A. Yes	8	(8.9)	33.8	0.021
B. No	82	(91.11)		

*Significant at $p \leq 0.05$; N = number

DISCUSSION

The present study examined the awareness and practices of reproductive age women in Saudi Arabia regarding FA supplementation in addition to whether these are impacted by income level. Insufficient levels of maternal FA and folate intake are associated with an increased risk of fetal NTDs (e.g., anencephaly, spina bifida). Daily dietary supplementation of FA (5 mg) periconceptionally reduces this risk and is particularly important for women with previously affected offspring [8]. In Saudi Arabia, the

reported rate of NTDs was 0.78/1,000 and 0.82/1,000 live births in the Asir [15] and southwestern [16] regions, respectively. These are consistent with the countrywide decline in the frequency of NTDs (from 1.9/1,000 live births in 1997 – 2000 to 0.76/1,000 live births in 2001 – 2005) due to the fortification of flour with FA [17].

The data collected in this study showed that the majority of expecting mothers (91.1%) were aware of FA. This is higher than reported by Al-Hakeem (58%) in Riyadh in 2012 [13]. Awareness of FA's importance remains low among women worldwide, including Britain [18]

Table 5: Association between income level and sources of information on awareness about time of use of FA among study participants

Variable	Income/month**				Chi sq	P-value*	Income/month**, pregnant women (n=90)				Chi Sq	P-value*
	Non-pregnant women (n=90)						≤800	800-1600	1600-2100	>2100		
	≤800	800-1600	1600-2100	>2100								
Have you heard about folic acid?												
A. Yes	40	8	10	15	0.09	0.77	11	28	21	22	0.08	0.64
B. No	10	3	2	2			2	2	1	3		
Do you know the proper time for using folic acid supplement?												
A. Before conception	16	4	3	9	0.05	0.38	10	23	13	18	0.07	0.53
B. After conception	34	7	9	8			3	7	9	7		
What is your main source of knowledge about folic acid?												
A. Doctor	7	0	1	3	0.17	0.73	8	17	11	13	0.06	0.49
B. Nutritionist	5	0	2	3			0	3	1	1		
C. Nurse	9	1	3	4			1	0	0	0		
D. Books and Magazines	6	1	0	2			0	1	0	1		
E. Previous experiences	0	0	0	0			1	4	5	5		
F. Mass media	17	5	5	4			1	2	2	0		
G. Friends and Relatives	6	4	1	1			2	3	3	5		

**Significant at $p \leq 0.05$; ** Income in United States dollar (USD)

and the United States [19]. In a study of women of reproductive age in Dublin, Ireland, the authors reported that 67% of the women surveyed were aware of the significance of FA [20]. Relative to the outcomes of the present study, FA cognizance among women in China and Qatar was much lower (36.0% and 53.7%, respectively) [21, 22]. A study in Abu Dhabi, United Arab Emirates (UAE) found that 79.1% of the mothers interviewed had heard of FA and 66.7% were additionally aware of its importance [23]. In the same study, 46.6% had accurate information and 36.3% were cognizant of the dietary sources of folate. The authors stated that doctors were the greatest resource for enhancing women's awareness and understanding of folate's role during pregnancy [23].

In this study, also doctors and previous pregnancies were the primary sources of information regarding FA supplementation for pregnant women and for non-pregnant women; media was the most common source of information. This finding is similar to reports by Bener *et al* [22] and women living in Vancouver, Canada [24] and Abu Dhabi, UAE [23].

Despite the multitude of empirical evidence in support of the efficacy of periconceptional FA supplementation toward reducing NTDs, the present study found that only 71.1% of pregnant women were actually following the recommended guidelines. This might be caused by insufficient awareness regarding the importance of FA.

In this study, 36.7 % of pregnant women and 23.3 % of non-pregnant women were aware that FA is a vitamin, which is much lower than a previous report in Burton (West Midlands, England) [25]. Almost half of the pregnant women and one-third of non-pregnant women surveyed here were aware that FA prevents NTDs, which is also lower than the value reported by Sen *et al* [25] but higher than the results described by others [19,26]. The results of the present study showed that both pregnant and non-pregnant women were insufficiently informed regarding FA-rich foods, which is in line with the results reported by Al-Hakeem [13].

In this study, only 36.7 % of expecting mothers were aware of which foods have high levels of FA, which is consistent with the report by Al Hosani *et al* [23] who found that only one-third of reproductive-age women were cognizant about the significance of folate in pregnancy and only 28.3 % of them could recall correct dietary sources of FA. Age and education level were the chief factors associated with knowledge of the

importance of FA supplementation periconceptionally and during pregnancy. In the present study, no association was found between income level and FA knowledge in both groups. In contrast, a study in Lebanese women found that FA awareness and use correlated with income stability [27]. Similarly, Fatima *et al* reported an association between income stability and FA awareness and use [28].

Educational strategies in addition to food fortification can be adapted to improve FA awareness levels. However, Al Akhfash *et al* [29] expressed concern regarding the fortification of food with FA at the population level due to an upsurge in colorectal cancer risk during the FA fortification period [30].

Limitations of the study

This study has some limitations. The use of the random sampling method resulted in a sample size that was relatively quite small compared to the whole population. Since the survey data were collected from a somewhat smaller region (Al-Hada Armed Forces Hospital and Khaliss General Hospital for pregnant women and Omm Al-Qura University in the Makkah governorate for non-pregnant women); therefore, the outcomes of this study cannot be generalized to the wider population.

CONCLUSION

The findings of the present study are suggestive of the lack of adequate awareness of the significance of this essential micronutrient in human reproduction. Nutrition and health education should be provided to women to improve their knowledge of FA to ensure the healthy growth and development of both mother and baby.

DECLARATIONS

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Conflict of interest

No conflict of interest is associated with this work.

Contribution of authors

We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

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