



## THE AWARENESS OF THE IMPORTANCE OF FOLIC ACID INTAKE IN PERICONCEPTIONAL PERIOD AMONG SAUDI WOMEN VISITING PRIMARY HEALTH CENTERS IN AL-AHSA, SAUDI ARABIA, 2018

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### ABSTRACT

**Background:** Folic acid deficiency will cause health problem for both mother, and her fetus. These health problems include megaloblastic anaemia in the mothers and neural tube defect in the fetus the prevalence of which is 1.2 per 1000 live births in the Kingdom of Saudi Arabia.

**Objective:** This study aimed to assess the level of The Awareness and knowledge of the Importance of Folic Acid intake in Periconceptional Period in preventing NTD among Saudi Women Visiting Primary Health Centers in Al-Ahsa.

**Method:** This was a cross-sectional study. A self-administered questionnaire was answered by 403 Saudi women aged between (15-44) years who were visiting PHCs in Al-Ahsa after taking their consents. The selection of participants was made by systematic random sampling after cluster sampling of Al-Ahsa primary health centers.

**Results:** Approximately half of the participants (200) were between the age group 21 - 30 years; the study showed that 31.3% of women had a good awareness of folic acid. However, the majority of women (68.7%) were either unaware of folic acid at all or had poor awareness. Regarding knowledge, 58.8% of women had good knowledge, and 41.2% were found to have poor knowledge towards folic acid. Educational level and the number of children were significantly associated with knowledge level (p-value 0.001, and < 0.001 respectively). Age groups, number of children and planning of pregnancy were significantly associated with the level of awareness (p-value 0.044, < 0.001 and 0.028 respectively).

**Conclusion:** As the percentage of women who heard about folic acid is 94% and 24% of them not taking it, we need to improve the awareness by involving the counseling about folic acid importance for both couples in premarital counseling and distribute brochures by Public health campaigns to declare the effect of folic acid on preventing NTDs.

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### INTRODUCTION

Folic acid is recognized as a significant element in the preconception care of women within the reproductive age. Folic acid deficiency can cause health problem for both mother and her fetus. These health problems include megaloblastic anaemia in the mothers and neural tube defect in the fetus. This serious birth defect occurs early in pregnancy even before a woman realizes that she is pregnant<sup>(1, 2, 3)</sup> In the United States, around 1500 babies are annually born with spina bifida and more than 300,000 cases per year worldwide<sup>(4)</sup>. The prevalence of these complications is estimated to be 1.2 per 1000 live births in the Kingdom of Saudi Arabia.<sup>(5)</sup> Acknowledging the gravity of the situation a NTD registry was established in Saudi Arabia in the year 2000, and from October 2000 to December 2009 the total registration number was 579 patients<sup>(5)</sup>; Studies showed that folic acid supplementation during pre-conceptual and during the first three months of

pregnancy has been responsible for 50-70% decrease in neural tube defect [NTD].<sup>(1,4)</sup> Approximately 78% reduction of NTD among children born to mothers who took folic acid is also mentioned in the Lancet study (1991)<sup>(5, 6)</sup>. WHO and CDC recommend a daily dose of 400 µg folic acid 3 months before conception and until 12 weeks of gestation<sup>(7)</sup>.

The knowledge and awareness of importance of folic acid supplementation among women is necessary for the required intake of folic acid and prevent the complications to the mothers and fetus. Awareness on preconception folic acid supplementation is defined as one's level of understanding about the importance and implications of folic acid supplementation on woman's safety.<sup>[8]</sup>

Various studies have been conducted around the world to assess the knowledge and awareness of the women regarding the folic acid supplementation. In UK study (2013) the researchers have found that 97.4% of their participants were

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aware about folic acid intake importance and 51.9% of them knew that folic acid protects against a spina bifida. <sup>(9)</sup>In a cross sectional study (2015) done in Netherland showed a significant association between low socio-economic status and low preconceptional folic acid intake but higher intention to seek preconception care. <sup>(10)</sup> In Saudi Arabia, five different regions published articles about the level of awareness and knowledge of the importance of folic acid among women in a childbearing age which are Riyadh, Jeddah, Makah, Hail and Al-Qassim. As a comparison between different studies in Saudi Arabia, the level of the awareness about folic acid in Al-Qassim study was 88.4%, and only 4.4% of them took folic acid before pregnancy <sup>(1)</sup> compared to Jeddah which was 91.8% of the participants heard about folic acid, and 85.6 % had taken it <sup>(4)</sup>. In Riyadh, 35.66% of women started folic acid when they realize they are pregnant but only 22% of women began FA preconceptional and around 50% gave a correct reason for taking it. <sup>(5)</sup> In Hail, 91% of the study subjects have heard or read about folic acid and 81% of them knew that folic acid has a role in preventing NTDs <sup>(11)</sup> whereas in Makkah almost two-thirds (65.2%) of participated pregnant women had sufficient knowledge about the importance of folic acid supplementation during pregnancy, and the majority of them (81.8%) had taken it. <sup>(7)</sup>

To improve the awareness among women in reproductive age group (15-44 years) of the importance of folic acid consumption periconceptionally, we needed to study their level of knowledge, and the possible factors that affected their awareness of the importance of folic acid in the prevention of NTD.

To best of our knowledge there is no baseline data on current awareness of women of reproductive age group age (15-44 years) in the eastern province region of Saudi Arabia regarding folic acid, particularly concerning their knowledge of the necessity for increased consumption of folic acid to prevent neural tube defect.

This was the first of the kind of study to be conducted in Al Ahsa district of Saudi Arabia. This study aimed to assess the level of the Awareness of the Importance of Folic Acid intake in Periconceptional Period in preventing NTD among Saudi Women Visiting Primary Health Centers in Al-Ahsa.

## MATERIALS AND METHODS

This was a cross sectional survey conducted at health care centers of Al Ahsa district of Saudi Arabia. All the Saudi women of childbearing age (15-44 years) <sup>(17)</sup> who attended Anti Natal Care (ANC) at primary health care centers in Al-Ahsa were the study population. The sampling was made in a multistage sampling technique. Seventy-one primary healthcare centers were identified in Al-Ahsa, 14 centers were excluded because of long distance. Fifty-seven remaining centers were divided into three regions, i.e. (Al-Omran, AlMubarraz and Hofuf). Each area has a different number of PHCs. The sample size calculated for patients was 421 based on the prevalence of pregnant women visiting PHC in an eastern region <sup>(12)</sup>. All these 421 patients were proportionally divided into the clustered areas. Twenty-one patients from each assembled PHC center were included by systematic random sampling (every 3rd patient) in the study. All PHCs were coded, and then the code was entered into a computer and then by using Microsoft Excel; the cluster sample of coded PHC was taken randomly. Each chosen PHC through cluster sampling was visited and systematic sampling technique of

every 3rd patient visiting the ANC. The sample size was calculated by using a web-based sample size calculator <sup>(24)</sup>. According to MOH Statistical Yearbook <sup>(12)</sup>, and according to the latest statistics for people visiting PHC during the year 1436, the average number of Saudi women attending PHC for ANC in Al-Ahsa is about 91078 per year. To calculate the estimated sample size, we used a confidence level of 95% and confidence interval (margin of error) of 5; the expected sample size was 383. This sample size was increased by 10% to improve the response rate and to make sure that the margin of error will not override 5 in case of non-responder. So, the final estimated sample size of this study was  $383 + 10\% = 421$  participants.

A validated self-administered questionnaire was used for this study. This questionnaire was used in the previous study of the same subject we have researched <sup>(9)</sup>. A pilot study on 42 participants was done before starting the main survey that was later excluded from the study.

The data included the socio-demographic such as age, education level, marital status, and number of children, number of miscarriage and the number of children affected by malformation. The questionnaire regarding knowledge and awareness of the importance of folic acid in the periconceptional period consisted of questions on patient's knowledge about folic acid, its benefits to pregnant women, and the best time to start it and the source of patient information.

After filling each questionnaire, it was checked for completeness, verified for an inconsistency or outlier readings, and put in an envelope related to each PHC center. Data were recorded into a computer and analyzed using the Statistical Package for the Social Sciences (SPSS) software version 21. The age and the number of children were presented in the form of mean, and standard deviation. Categorical data were introduced in the way of frequency distributions and percentage. We did a Chi-squared test with socio-demographic data to see the significance, and then any significant result of Chi-square was entered into the logistic regression model in SPSS to eliminate the effect of the confounder. The cut point of statistical significant (p-value) is set at  $< 0.05$ .

The questionnaires consisted of questions with answers in likertscale, there were some question with yes and no answers. Each correct question was given score 5, and while incorrect question fetched 0 marks. On the likert scale neutral answer was considered as disagree while agree and strongly agree was grouped as agree. The same way the disagree and strongly disagree was group in disagreed group. The mean from the total of all participants was calculated and those who scored more than the mean were considered to have good awareness.

A request letter for approval to conduct the research in Al-Ahsa primary centers was sent to Public Health Administration in General Directorate of Health Affairs in Al-Ahsa. The letter clarified the objectives of the study, the importance of the responses and as well as the assurance of confidentiality of the individuals participating in the study. The researchers explained to patients the study purpose, and ensured to them the confidentiality of their data before taking their oral and written consent.

**RESULTS**

A total of 403 participants participated in this study making the response rate of 95.7%. The Mean age of participant was 31.74 ± 48.83. Approximately half (50%) of the participants were between the age group 21 - 30 years followed by 30% women who belonged to 31 - 40-year age group and 11% were in 16 - 20 years of age group. Almost 67% of women had their more than a third visit to the hospital followed by 17% were first visitors. Majority of the participants (62%) have graduated, and 27% had completed their secondary school. Regarding monthly income, majority (40%) participants earned 5000 - 10000 SAR per month followed by 16% whose earning was between 10000 - 15000 SAR. Thirty-five percent of women had 1 - 2 children accompanied by 30% who had 3 - 5 children and approximately 28% were having their first pregnancy. Majority of the participant (67%) haven't undergone abortion ever followed by 21% who had experienced abortion once during their life and 3% of which were due to congenital abnormalities. Twenty-seven percent of women had planned their pregnancy without consulting doctor followed by 26% who were non-users of contraceptives and 22% women got pregnant without preparing for it. Thirty-six percent of women had their first visit to the gynecologist at 44thweek of conception followed by 19% who were newly pregnant and 19% who were visiting between 5 - 8 weeks of their pregnancy. The details of the demographic profile are shown in table 1.

**Table 1** Demographics characteristics of the participants

Demographic variables	Total Number (N)	Percentage
Age group:		
16 - 20	45	11%
21 - 30	200	50%
31 - 40	123	30%
>40	35	9%
Number of visits:		
1st visit	69	17%
2nd visit	36	9%
3rd visit	29	7%
more than 3 times	269	67%
Educational Level:		
Not educated	1	1%
Primary school	11	3%
Intermediate school	35	9%
Secondary school	107	27%
Graduate	249	62%
Income:		
less than 5000	128	32%
5000 to 10000	163	40%
10000 to 15000	64	16%
more than 15000	48	12%
Number of children:		
No children	114	28%
1 - 2	143	35%
3 - 5	119	30%
>5	27	7%
Abortion status:		
No abortion	277	69%
Once	84	21%
Twice	24	6%
Three times or more	17	4%
Have you ever ended pregnancy because of congenital abnormalities in the fetus?		
No	392	97%
Yes	11	3%
How long was the pregnancy at your first visit to the doctor?		
New pregnancy	77	19%
4 weeks	144	36%
	78	19%

Between 5 - 8 weeks	20	5%
Between 9 - 12 weeks	14	2%
More than 12 weeks	70	17%
I do not remember		

**Response to the awareness questions**

Regarding the awareness ninety four percent of the participants (N=378) asserted that they were aware about the folic acid. So the awareness questions regarding the use of folic acid were asked from these participants. As far as the supplementation therapy of folic acid is concerned only thirty percent of the participants (N=113) were aware with the fact that it should be taken preconceptionally and during pregnancy. However more than eighty two percent (N=311) of the participants were aware about the frequency of dose of folic acid supplementation and almost 38 percent of the participants (N=143) were not at all aware as when to stop taking folic acid supplementation. The response of the statement that 'since nobody in my family has baby with birth defect so I don't need to take folic acid supplementation' was that the majority (59%, N= 225) of the participants agreed .The details of the response of the awareness questionnaire are shown in table 2.

**Table 2** Response of the awareness questions

Questions	N (Number)	Percentage
Have your ever heard about Folic acid		
Yes	378	94
No	25	6
Total	403	100
When should it be taken as supplementation		
Before pregnancy	152	40.22
During pregnancy	113	29.89
Before pregnancy and during pregnancy	113	29.89
Total	378	100
How many times a day should folic acid be taken by the pregnant women		
Once orally	311	82.28
Twice to three times a day	27	7.14
Once weekly	5	1.32
I don't know	35	9.26
Total	378	100
When should you stop taking folic acid		
Once pregnancy is confirmed	45	11.90
After 3 months of pregnancy	110	29.10
Immediately after birth	80	21.16
I don't know	143	37.83
Total	378	100
Since nobody in my family has baby with birth defect so I don't need to take folic acid supplementation		
Strongly agree	96	25.40
Agree	129	34.13
Neutral	12	3.17
Disagree	55	14.55
Strongly disagree	85	22.49
Total	378	100

The mean score of the answers of awareness questions was 20.51, and the results suggested that 31.3% of women had good awareness of folic acid (their scores are more than the mean score). However, the majority of women (68.7%) are either unaware of folic acid at all or had poor awareness. The details of the awareness score is shown in table 3.

**Table 3** Folic acid awareness score

Folic acid awareness	Frequency	Percent	Mean score
Good awareness	126	31.3%	20.51
Poor Awareness	277	68.7%	

**Response of the knowledge questions**

There were 378 participants who knew about folic acid and its supplementation during pregnancy and so they were asked the knowledge questions. More than forty two percent of the participants (N=159) agreed with the statement that daily intake of food contains sufficient folic acid and so there is no need of taking supplementation of folic acid during pregnancy. More than eighty one percent (N=309) of the participants agreed with the statement that folic acid supplementation is necessary to prevent birth defect in child but almost fifty two percent of the participants (N=196) did not agree with the saying that folic acid supplementation is necessary to prevent anemia among the pregnant women. When asked with the statement that folic acid supplementation should be taken only once in life during the first pregnancy, more than seventy eight percent (N=297) of the participants disagreed. Fifty two percent (N=196) of the participants did not know that food contains folic acid and forty seven percent of the participants (N=178) were correct in answering that green leafy vegetable contains folic acid. Only forty one percent (N=155) of the participants agreed with the statement that folic acid causes severe side effects which outweighs its benefit and more than sixty five percent (N=245) agreed that folic acid is freely available at Primary health care centers. With the specific questions that 'If food containing folic acid is taken in good quantity during pregnancy, there is no need of supplementation' only about thirty nine percent (N=159) disagreed. The details of the answers of the knowledge section are shown in table 4.

**Table 4** Answers on the Knowledge towards folic acid and its supplementation during pregnancy

Knowledge questions	Total number (N)	Percent(%)
Daily intake of food contains sufficient folic acid and so there is no need of taking supplementation during pregnancy		
Strongly agree	28	7.40
Agree	131	34.66
Neutral	0	0
Disagree	19	5.04
Strongly disagree	200	52.91
Total	378	100
Folic acid supplementation is necessary to prevent birth defect in child		
Strongly agree	209	55.29
Agree	100	26.46
Neutral	9	2.38
Disagree	60	15.87
Strongly disagree	0	0
Total	378	100
Folic acid supplementation is necessary to prevent anemia among pregnant women		
Strongly Agree	100	26.46
Agree	96	25.40
Neutral	47	12.43
Disagree	128	33.86
Strongly disagree	7	1.85
Total	378	100
Folic acid should be taken only once in life during the first pregnancy		
Strongly Agree	30	7.94
Agree	51	13.49
Neutral	104	27.52
Disagree	124	32.80
Strongly disagree	69	18.25
Total	378	100
Folic acid supplementation cause severe side effects which outweighs its benefits		

Strongly Agree	78	20.63
Agree	77	20.38
Neutral	0	0
Disagree	99	26.19
Strongly disagree	124	32.80
Total	378	100
Folic acid supplementation is freely available at Primary health center and is distributed to the pregnant women free of cost		
Strongly Agree	124	32.80
Agree	121	32.01
Neutral	13	3.44
Disagree	69	18.25
Strongly disagree	51	13.49
Total	378	100
Folic acid supplementation also prevents cystic fibrosis		
Strongly Agree	86	22.74
Agree	147	38.89
Neutral	96	25.50
Disagree	39	10.32
Strongly disagree	10	2.55
Total	378	100
Do you know the food containing folic acid		
Yes	182	48.15
No	196	51.85
Total	378	100
Which of the following food contain folic acid		
Dark leafy green vegetables	178	47.09
Dried beans and peas	145	38.35
Citrus fruit and juices	45	11.90
All of the above	10	2.66
Total	378	100
If food containing folic acid is taken in good quantity during pregnancy there is no need of supplementation		
Strongly Agree	124	32.80
Agree	111	29.36
Neutral	10	2.65
Disagree	120	31.75
Strongly disagree	13	3.44
Total	403	100

The mean score in the knowledge section was 27.95 with Std.  $\pm$  2.67. More than fifty Eight percent of the women (N=237) of women had good knowledge, and 41.2% were found to have poor knowledge towards folic acid supplementation. The details of the score in knowledge section are shown in table 5.

**Table 5** Folic acid knowledge

Folic acid Knowledge	Frequency	Percent	Mean score
Good knowledge	237	58.8%	27.95
Poor knowledge	166	41.2%	

Table 6 shows the association between different demographic factors and level of knowledge. Out of 7 demographic factors, five were found to have a significant association with level of knowledge. These are education level (p-value 0.002), number of children (p-value < 0.001), and planning for a pregnancy (p-value < 0.001), income (p-value < 0.024) and abortion status (p-value < 0.019).

**Table 6** Association between level of knowledge and demographic factors

Variables	Knowledge		P - value (chi-sq)
	Poor n (%)	Good n (%)	
<b>Age group:</b>			0.148
16 - 20	18 (4.5)	27 (6.7)	
21 - 30	71 (17.6)	129 (32.0)	
31 - 40	38 (9.4)	85 (21.1)	
>40	18 (4.5)	17 (4.2)	

Variables	Poor n (%)	Good n (%)	P - value (chi-sq)
<b>Educational Level:</b>			0.002
Not educated	1 (0.2)	0 (0.0)	
Primary school	10 (2.5)	1 (0.2)	
Intermediate school	12 (3.0)	23 (5.7)	
Secondary school	40 (9.9)	67 (16.6)	
Graduate	82 (20.3)	167 (41.4)	
<b>Number of children:</b>			< 0.001
No children	65 (16.1)	49 (12.2)	
1 - 2	32 (7.9)	111 (27.5)	
3 - 5	38 (9.4)	81 (20.1)	
>5	10 (2.5)	17 (4.2)	
<b>When planning a pregnancy, do any of the following:</b>			<0.001
Stop contraception without consulting doctor	30 (7.4)	81 (20.1)	
Stop contraception after consulting doctor	5 (1.2)	10 (2.5)	
Do not use contraception	36 (8.9)	67 (16.6)	
Pregnancy without planning	26 (6.5)	63 (15.6)	
I do not remember	18 (4.5)	20 (5.0)	
<b>Income:</b>			0.024
less than 5000	65 (16.1)	63 (15.6)	
5000 to 10000	66 (16.4)	97 (24.1)	
10000 to 15000	20 (5.0)	44 (10.9)	
more than 15000	15 (3.7)	33 (8.2)	
<b>Did participant have abortion before?</b>			0.019
Never	127 (31.5)	150 (37.2)	
One time	22 (5.5)	62 (15.4)	
Two times	9 (2.2)	15 (3.7)	
Three or more	7 (1.7)	10 (2.5)	

The level of awareness and its association with demographic factors is shown in table 7. The association test was applied to check the relationship, and the results suggested that age group (p-value < 0.001), the number of children (p-value < 0.001), planning for a pregnancy (p-value < 0.001), level of monthly income (p-value 0.010) and abortion status (p-value 0.040) were found to have significant association with level of awareness. Whereas, educational level (p-value 0.177) had not shown any significant association with awareness.

**Table 7** Association between level of awareness and demographic factors

Variables	Awareness		P - value (chi-sq)
	Poor n (%)	Good n (%)	
<b>Age group:</b>			
16 - 20	19 (4.7)	26 (6.5)	
21 - 30	143 (35.5)	57 (14.1)	< 0.001
31 - 40	94 (23.9)	29 (7.2)	
>40	21 (5.2)	14 (3.5)	
<b>Educational Level:</b>			0.177
Not educated	1 (0.2)	0 (0.0)	
Primary school	4 (1.0)	7 (1.7)	
Intermediate school	25 (6.2)	10 (2.5)	
Secondary school	72 (17.9)	35 (8.7)	
Graduate	175 (43.4)	74 (18.4)	
<b>Number of children:</b>			< 0.001
No children	32 (7.9)	82 (20.3)	
1 - 2	128 (31.8)	15 (3.7)	
3 - 5	98 (24.3)	21 (5.2)	
>5	19 (4.7)	8 (2.0)	
<b>When planning a pregnancy, do any of the following:</b>			< 0.001
Stop contraception without consulting doctor	95 (23.6)	16 (4.0)	
Stop contraception after consulting doctor	10 (2.5)	5 (1.2)	
Do not use contraception	73 (18.1)	30 (7.4)	
Pregnancy without planning	72 (17.9)	17 (4.2)	
I do not remember	22 (5.5)	16 (4.0)	

Variables	Poor n (%)	Good n (%)	P - value (chi-sq)
<b>Income:</b>			0.010
less than 5000	74 (18.4)	54 (13.4)	
5000 to 10000	117 (29.0)	46 (11.4)	
10000 to 15000	50 (12.4)	14 (3.5)	
more than 15000	36 (8.9)	12 (3.0)	
<b>Did participant have abortion before?</b>			0.040
Never	179 (44.4)	98 (24.3)	
One time	67 (16.6)	17 (4.2)	
Two times	18 (4.5)	6 (1.5)	
Three or more	13 (3.2)	4 (1.0)	

Furthermore, regression analysis was applied to understand the association between awareness levels. After controlling the confounders, age groups, number of children and planning of pregnancy were significantly associated with the level of awareness (p-value 0.044, < 0.001 and 0.028 respectively). However, monthly income and abortion status have shown no association with level of awareness (p-value 0.096, 0.875, and 0.237 respectively). Educational level and a number of children were significantly associated with knowledge level (p-value 0.001, and < 0.001 respectively) Planning regarding conception, income, and abortion status had not shown any significant association with level of knowledge after regression analysis (p-value 0.353, 0.180, 0.349 respectively).The regression analysis for the level of knowledge and demographic factors. Educational level and a number of children were significantly associated with knowledge level (p-value 0.001, and < 0.001 respectively).In contrast to awareness, it appears the more the children the participant has, the better the knowledge about folic acid. The odds ratio of having good knowledge in those with more children is 1.575 times compared to those with lesser or no children, p-value < 0.001, 95% CI (1.235 - 2.009).

## DISCUSSION

Several studies were conducted nationally and internationally to assess the level of awareness of taking folic acid, especially about the correct time and the benefits of this vitamin for preventing neural tube defect in a pregnancy. In our study, the result suggested that the majority (94%) of women had heard about folic acid .More than thirty one percent (126) of 403 participants had good awareness level. The majority of women (68.7%) were either unaware of folic acid at all or had poor awareness.

As compared to other similar studies in Saudi Arabia, the level of the awareness about folic acid was 88.4% in Al-Qassim study <sup>(1)</sup> but only less than 5% of them took folic acid before pregnancy, compared to Jeddah <sup>(3)</sup> where 91.8% of the participants heard about folic acid and 85.6% had actually taken it. In Riyadh, more than thirty five percent of women started folic acid when they realized that they are pregnant but only 22% of women began taking preconceptional folic acid and around 50% gave a correct reason for taking it <sup>(5)</sup>In Hail, 91% of the study participant have heard or read about folic acid, and 81% of them knew that folic acid had a role in preventing Neural Tube Defects( NTDs) <sup>(11)</sup>. Whereas in Makkah almost two-thirds (65.2%) of participated pregnant women had sufficient knowledge about the importance of folic acid supplementation during pregnancy and the majority of them (81.8%) had taken it <sup>(7)</sup>.

A cross-sectional study done in the United Arab Emirate <sup>(13)</sup> has showed that 46.4% of the participants had heard about folic acid and only (8.7%) knew that it prevent NTD. This

percentage was higher among women with higher education level. Another study done in Lebanon stated that 60% of respondents had heard about folic acid and women with younger age, higher education and stable income were significantly more aware of the importance of folic acid<sup>(14)</sup>.

In western countries, the awareness percentages were (76.3%, 62.7%, 79% and 50.6%) in British, Northeastern Ontario, Netherland, and Spain respectively<sup>(15-16)</sup>. In a larger study done in Europe showed that overall, 70% of Europe women reported that they had heard of folic acid and 40% stated that they knew the benefits of folic acid<sup>(17)</sup>. However, the awareness and knowledge of the benefits of folic acid were particularly low among young women<sup>(18)</sup>.

In our study, the association test was applied to check the relationship, and the results suggested that age group (p-value < 0.001), the number of children (p-value < 0.001), planning for a pregnancy (p-value < 0.001), level of monthly income (p-value 0.010) and abortion status (p-value 0.040) were found to have significant association with level of awareness. Whereas educational level (p-value 0.177) had not shown any significant association with awareness, and that might be as a reason of the effect of social media on the public awareness toward different issues.

After controlling the confounders, the age groups, number of children and planning of pregnancy were significantly associated with the level of awareness (p-value 0.044, < 0.001 and 0.028 respectively), that is the more the age, the more the awareness level, however, this result goes with the outcome of Hail study on the same topic<sup>(21)</sup>. With comparison to other research conducted in the urban city regarding age differences, preconceptional folic acid knowledge was lower among the younger respondents, and the non-fertile age group.<sup>(10,3)</sup> Regarding the knowledge in this study, (58.8%) of women have good knowledge and 41.2% were found to have poor knowledge towards folic acid. This study also found that the more the children the participant had, the better the knowledge about folic acid. we found that no association between the level of education and the level of awareness but it was significantly associated with knowledge level (p-value 0.001) by mean the higher the education level, the better the knowledge about folic acid and that's the same has been supported by other investigators in KSA and Qatar<sup>(1,19)</sup>. In turkey, (48.2%) of participants were aware of folic acid for the prevention of congenital anomalies. Knowledge and use of folic acid increase with socioeconomic status and educational level<sup>(20)</sup>. Multiple reasons are thought to be contributing to poor awareness and knowledge in our study participants such as insufficient health education by the medical staff as well as the public health educator<sup>(1)</sup>.

Although 94% of women heard about folic acid, 26% of them not adhered to taking the supplement. The reason is that 69% of women who took it were either unaware of folic acid at all or had poor awareness, and only 15% of the participants knew the dietary sources of folic acid, while the majority of them (85%) did not know, and this result is similar to the study done in Europe with only (40.6%) know the sources<sup>(14)</sup>. For that, we need to increase the awareness among women in reproductive age group about the importance of taking folic acid to prevent the birth defect and enhance their adherence and to encourage the health campaign to educate the women about folic acid and its natural sources as well as its importance<sup>(17)</sup>.

Over and above, our study found that the early visit to the antenatal clinic have not improved women's awareness and knowledge about folic acid as the total percentage of visits to the ANC during 1<sup>st</sup> three month of pregnancy was 79% while the awareness level was 31% and knowledge level was (58.8%). That was discussed in the study which conducted in a large teaching hospital in the UK, which they attributed the poor awareness despite their visit in ANC to the lack of leaflets as well as the dereliction from the doctors and midwives whose usually not discuss the importance of folic acid in preventing NTD with the women<sup>(9)</sup>. Also, we thought that poor communication between the doctors and the patients during the clinic play an important role in the awareness of the patient toward different health problems<sup>(21)</sup>.

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