

**Awareness and Knowledge of Folic Acid Intake among Women in the Reproductive Age in ARAR Region, Saudi Arabia**

**Abstract:**

**Background:** Folic acid reduces the risk of neural tube defects. As approximately 50% of pregnancies are unintended, women of reproductive age should be aware of the importance of folic acid. This study aims to assess the level of awareness and knowledge among childbearing female on the importance of preconception folic acid supplementation in preventing neural tube defects (NTDs) in Arar city.

**Methodology:** A population-based cross-sectional study was conducted in Arar city, Northern Saudi Arabia on included Saudi women in reproductive age. A pre-designed online questionnaire was used for data collection. Data was entered and analyzed using statistical package for Social Sciences Program, version 20 (SPSS Inc., Chicago, Illinois, USA). The results were displayed as counts, percentages. appropriate statistical tests will be used for comparisons.  $P \leq 0.05$  is considered significant.

**Results:** The sample consisted of 428 women in reproductive age, 60.1% aged between 30 to 40 years, 39% aged between 20 to 30 years and only 0.9% aged between 18 to 20 years old. 91.8% were married. 85% of participants reported that their doctor prescribed folic pills for them before. 95.1% think that women should take folic acid pills in pregnancy while 75.2% think that it is necessary to take folic pills pre-pregnancy. 85.3% had taken folic acid pills in previous pregnancy. 31.3% think that it should be stopped after pregnancy. 84.6% think that folate deficiency causes fetal abnormalities. Only 8.4% of studied women reported attending seminar or lecture on folic acid importance.

**Conclusion:** The results of the current study affirmed good knowledge of folic acid supplementation usage during pregnancy among women in Arar, KSA. There was a significant association between knowledge of folic acid taking importance during pregnancy with marital status, number of children, and educational level of participants.

**Key words:** Awareness, Knowledge, Folic Acid, Women in the Reproductive Age, Arar, Saudi Arabia

**Introduction:**

Neural tube defects (NTDs), including spina bifida, anencephaly, encephalocele are most common reasons of morbidity and mortality among infants and neonates. The incidence of NTDs has decreased over the past 60 years and is about 1-2 per 1000 babies in the general population (1).

There is strong evidence that folic acid intake by women in reproductive age improves normal embryonic development and prevents NTDs.(2) Although, the exact mechanism of NTD prevention by folic acid remains largely unknown, some studies show evidence of increase in NTD during exposure to folate antagonist medications and the presence of high anti-bodies titre to folate receptors in women with a past history of NTD.(3)(4)

Although, folic acid plays a role in preventing anemia and peripheral neuropathy in mother during pregnancy, it can also prevent growth retardation, congenital heart defects, low birth weight, smaller chest and head circumference, cleft lip and preterm delivery of the fetus .(5)(6)

Normal diet is very important for pregnant women. It contains proteins, fats, carbohydrates, vitamins, and minerals. It is the best way to receive nutrients, but basic vitamin administration can also have a beneficial role, in case of unsuspected deficiency. vitamin supplementation does not replace a balanced diet but rather confirm that a pregnant woman is taking enough daily requirements. (7)

Folic Acid can be found in a lot of foods such as eggs, meat, liver, and leafy vegetable. These source alone may not contain the ideal recommended daily of 400 mcg, since some of the folate sources can be lowered during cooking it.(8)(9)(10)(11)

A study conducted in Texas, USA, showed 78% of women had good awareness towards folic acid supplementation, 28% of participants believed it prevented birth defects and 25% knew to take it before conception. Only 33% of respondents reported daily folic acid supplementation.(12)

Similar study in Lebanon showed that only 60% of women had heard of folic acid and only 14% of participants had good knowledge regarding the benefits of folic acid to prevent NTDs. (13) Another study in Qatar displayed that 53.7% of studied subjects had heard of folate and only 20.3% of respondents reported their actual intake of folic acid.(14)

Regarding the level of awareness toward preconception folic acid supplementation among female college students, a study was conducted in Jeddah, KSA, that showed only 12% knew the benefit of folic acid in preventing NTDs. A previous research also displayed that the majority of women in the Saudi Arabia have low level of knowledge scores for good nutrition during pregnancy and lactation (15)(16).

In addition, a study done in Hail Region, Saudi Arabia showed high awareness among women, toward folic acid supplementation, as 91% had heard or read about FA and 81% knew that FA has an important role in preventing NTDs, moreover 70% had good knowledge about proper timing for FA supplementation and believed that FA should be taken during the first trimester of pregnancy, whereas 41 % responded believed that it should be taken before conception, while only 10% of the participants believed that it should be taken before conception as well as during

pregnancy. Over 77% of subjects obtained their information of FA intake from medical care providers including physicians, nurse, dietitian, and midwives.(17)

Reviewing the literature, showed that there is no study done in Northern Border Region in Kingdom of Saudi Arabia, which explored awareness, knowledge, attitude and behavior regarding Folic Acid Intake among women in the reproductive age in Arar, Saudi Arabia. This study aims to assess prevalence of intake of folate and perform a KAP on folic acid intake among women in reproductive age in Arar Region, Saudi Arabia.

## **AIM OF THE STUDY**

The aim of this study to assess the level of awareness and knowledge among childbearing female on the importance of preconception folic acid supplementation in preventing neural tube defects (NTDs) in Arar city.

## **Subjects & Methods:**

**Study design:** A cross sectional study was conducted during the period from 17th October through 30th December 2021.

**Study setting:** Arar city, Northern Saudi Arabia.

**Study population:** Saudi women in reproductive age in Arar city, KSA

### **Inclusion criteria:**

- Saudi women
- Reproductive age group aged 18 -40 years old
- Live in Arar city
- Welling to participate

### **Exclusion criteria:**

- Non-Saudi women
- Men
- Younger than 18 years old or older than 40
- Live outside Arar city
- Health care workers
- Don't want to participate

**Sampling:** The sample size is calculated based on the sample size formula(7).  $n = [z/ \alpha]^2 \times p [1-p]$ , where n is the sample size, z is the confidence interval (CI) assumed to be 1.96,  $\alpha$  is assumed to be 0.05 . p is the probability according to a previous study conducted in Saudi Arabia that reported 68% level of awareness regarding folic acid supplementation. The minimum sample size calculated for the present study is 335 women.

**Sampling technique:** Convenient sample from female responding to electronic questionnaire

**Data collection tool:** Self-administer questionnaire was distributed online. The questionnaire is developed by researcher after literature review. It contains questions on demographic data (e.g: age ,education ,income ).Twelve questions on knowledge (e.g: importance of folic acid supplementation ).Three questions on attitude and three questions on practice .The questionnaire was reviewed by three experts for validity and reliability.

**Data management:** Data was entered and analyzed using statistical package for Social Sciences Program, version 20 (SPSS Inc., Chicago, Illinois, USA). The results were displayed as counts, percentages. appropriate statistical tests will be used for comparisons.  $P \leq 0.05$  is considered significant.

**Ethical considerations:** Informed consent was taken from all study participants and authors assured them that Confidentiality of their data maintained during the study. Research clearance and approval Will be obtained from research ethical committee of Northern Borders General Health Affairs.

## **Results:**

According to table (1); the sample consisted of 428 women in reproductive age, 60.1% aged between 30 to 40 years, 39% aged between 20 to 30 years and only 0.9% aged between 18 to 20 years old. Most study participants 87.6% had university education while only 1.4% were uneducated. 91.8% were married. 50.5% of all participants were working.

In table (2); 16.1% had no children while 13.1% had one child, 14% had two, 10.3% had three, 11.7% had four, 12.6% had five and 13.1% had six children. 14.7% of all women were pregnant at the time of the study while 51.4% have plans for future pregnancy. 37.4% reported history of miscarriage. Only 1.9% had a child with malformation.

As illustrated in table (3, 4) 85% of participants reported that their doctor prescribed folic pills for them before. 83.2% of women know there is lot of information now available on the use of folic before pregnancy. 90% know that iron deficiency causes anemia. 95.1% think that women should take folic acid pills in pregnancy while 75.2% think that it is necessary to take folic pills pre-pregnancy. 96.3% think that folic acid pills are important in the first trimester of pregnancy, 2.3% think it is important in the second trimester while 1.4% think it is important in the third trimester.

95.3% reported that doctors recommend taking folic pills. 85.3% had taken folic acid pills in previous pregnancy. 31.3% think that it should be stopped after pregnancy. 15.7% think that folic acid dose is three pills per day. 84.6% think that folate deficiency cause fetal abnormalities.

Only 10.3% think that joint pain is a side effect of folic acid pills. Regarding natural sources of folic, 89.5% reported eggs and 10.5% bread. Only 52.8% reported that their diet is rich with folates. 75% think that folic acid is a vitamin, 16.6% think it is iron and only 8.4% think it is

protein. Only 8.4% of studied women reported attending seminar or lecture on folic acid importance.

According to table (5), there was a significant association between knowledge of folic acid taking importance during pregnancy with marital status, number of children, and educational level of participants.

**Table (1): Sociodemographic characteristics of participants (n=428)**

Parameter	No.	Percent	
Age	• 18- 20 years old	4	0.9
	• 20 - 30 years old	167	39.0
	• 31 - 40 years old	257	60.1
Education level	• Uneducated	6	1.4
	• Preparatory	9	2.1
	• secondary	38	8.9
	• university	375	87.6
Job	• work	216	50.5
	• not work	212	49.5
Social status	• married	393	91.8
	• divorced	23	5.4
	• widow	12	2.8

**Table (2): Number of children, pregnancy and planning for pregnancy, history of miscarriage and having a child with malformation (n= 428)**

Parameter	No.	Percent	
Number of children, if any	• None	69	16.1
	• 1	56	13.1
	• 2	60	14.0
	• 3	44	10.3
	• 4	50	11.7
	• 5	54	12.6
	• 6	56	13.1
	• More than 7	39	9.1

<b>Current pregnancy</b>	• Yes	63	14.7
	• No	365	85.3
<b>Future plans for pregnancy</b>	• Yes	220	51.4
	• No	208	48.6
<b>History of miscarriage</b>	• Yes	160	37.4
	• No	268	62.6
<b>Child with malformations</b>	• Yes	8	1.9
	• No	420	98.1

*Table (3): Knowledge of participants of importance of folic acid during pregnancy (n=428).*

<b>Parameter</b>		<b>No.</b>	<b>Percent</b>
<b>Previous Folic acid prescription by a doctor</b>	• Yes	364	85.0
	• No	64	15.0
<b>There is a lot of information now available on the use of folic before pregnancy</b>	• Yes	356	83.2
	• No	72	16.8
<b>Women should take folic pills during pregnancy</b>	• Yes	407	95.1
	• No	21	4.9
<b>Folic pills are important during</b>	• The first three months	412	96.3
	• middle three months	10	2.3
	• the last three months	6	1.4
<b>Doctors recommend taking folic pills</b>	• Yes	408	95.3
	• No	20	4.7
<b>Pills should be stopped after pregnancy</b>	• Yes	134	31.3
	• No	294	68.7
<b>Iron deficiency lead to anaemia</b>	• Yes	385	90.0
	• No	43	10.0

*Table (4): Knowledge of participants of folic acid and its associated factors and education about it (n=428).*

Parameter		No.	Percent
Folic acid dose is three pills per day	• Yes	67	15.7
	• No	361	84.3
Joint pain is one of the side effects of folic acid	• Yes	44	10.3
	• No	384	89.7
Natural sources of folic	• eggs	383	89.5
	• the bread	45	10.5
There is a preferred time during the day to take folic	• Yes	149	34.8
	• No	279	65.2
It is necessary to take folic pills in the pre-pregnancy period	• Yes	322	75.2
	• No	106	24.8
Overcooking reduce the nutritional value of folic acid	• Yes	172	40.2
	• No	256	59.8
Folate deficiency cause foetal abnormalities	• Yes	362	84.6
	• No	66	15.4
Folic pills are	• protein	36	8.4
	• iron	71	16.6
	• vitamins	321	75.0
History of taking folic pills in a previous pregnancy	• Yes	365	85.3
	• No	63	14.7
Attend any seminar or lecture on folic acid importance	• Yes	36	8.4
	• No	392	91.6
Have diet rich in folate	• Yes	226	52.8
	• No	202	47.2

*Table (5): Association between participants knowledge of folic acid and sociodemographic characteristics of participants*

		Women should take folic acid during pregnancy		Total (N=1020)	P value		
		Yes	No				
Age	Less than 20	3	1	4	0.278		
		0.7%	4.8%	0.9%			
	20 - 30 years old	157	10	167			
		38.6%	47.6%	39.0%			
	31 - 40 years old	166	8	174			
		40.8%	38.1%	40.7%			
	41 – 50 years old	76	2	78			
		18.7%	9.5%	18.2%			
	51 - 60 years old	5	0	5			
		1.2%	0.0%	1.2%			
	Education level	uneducated	6	0		6	0.005
			1.5%	0.0%		1.4%	
Preparatory		7	2	9			
		1.7%	9.5%	2.1%			
secondary		33	5	38			
		8.1%	23.8%	8.9%			
university		361	14	375			
		88.7%	66.7%	87.6%			
Working status		work	209	7	216	0.107	
			51.4%	33.3%	50.5%		
		not work	198	14	212		
			48.6%	66.7%	49.5%		
	Social status	married	378	15	393		0.001
			92.9%	71.4%	91.8%		
divorced		21	2	23			
		5.2%	9.5%	5.4%			
widow	8	4	12				

		2.0%	19.0%	2.8%	
<b>Number of children, if any</b>	<b>Nothing</b>	60	9	69	<b>0.037</b>
		14.7%	42.9%	16.1%	
	<b>1</b>	55	1	56	
		13.5%	4.8%	13.1%	
	<b>2</b>	59	1	60	
		14.5%	4.8%	14.0%	
	<b>3</b>	43	1	44	
		10.6%	4.8%	10.3%	
	<b>4</b>	48	2	50	
		11.8%	9.5%	11.7%	
	<b>5</b>	51	3	54	
		12.5%	14.3%	12.6%	
	<b>6</b>	55	1	56	
		13.5%	4.8%	13.1%	
<b>More than 7</b>	36	3	39		
	8.8%	14.3%	9.1%		
<b>Future plans for pregnancy</b>	<b>Yes</b>	210	10	220	<b>0.722</b>
		51.6%	47.6%	51.4%	
	<b>No</b>	197	11	208	
		48.4%	52.4%	48.6%	
<b>History of previous miscarriages</b>	<b>Yes</b>	156	4	160	<b>0.075</b>
		38.3%	19.0%	37.4%	
	<b>No</b>	251	17	268	
		61.7%	81.0%	62.6%	
<b>Child with malformations</b>	<b>Yes</b>	8	0	8	<b>0.517</b>
		2.0%	0.0%	1.9%	
	<b>No</b>	399	21	420	
		98.0%	100.0%	98.1%	

## Discussion:

In addition to the birth defects, FA deficiency during pregnancy may increase the risk of preterm birth, low birth weight and intrauterine growth retardation of the fetus, and it may raise the level of homocysteine in the blood. High homocysteine levels may lead to spontaneous abortions, placental abruption and pre-eclampsia [5]. This study aims to assess the level of awareness and knowledge among childbearing female on the importance of preconception folic acid supplementation in preventing neural tube defects (NTDs) in Saudi Arabia.

In our study, 95.1% think that women should take folic acid pills in pregnancy and 85.3% had taken folic acid pills in previous pregnancy. Another Saudi study reported that, during the pregnancy, almost 95% of women were using these supplementations to avoid maternal (anemia, peripheral neuropathy) and fetal (congenital abnormalities and NTD) complications [14]. Alreshidi et al.[18] studies have conducted the survey from Riyadh city and confirms 42.2% of pregnant women knows about supplementation of FA. Almost 80% of were known about prevention of NTDs and 46.8% of pregnant women consumed FA during pregnancy. Alodan et al.[19] studies performed at Security forces hospitals in Riyadh city and concluded as pregnant women had 80% of knowledge about FA supplementation but 53% of women only consumed the FA during pregnancy. Al-Rakaf et al.[20] also performed a similar study in pregnant women from Prince Sultan Hospital in Riyadh and confirmed the same conclusion from Alreshidi and Alodan et al.[18, 19] studies. An earlier research by Albader et al.[21] carried out in Riyadh city and AbdRabou et al.[22] studies carried out in Sakaka city were also confirms the similar conclusions from the prior studies carried in Saudi Arabia. Ahmad et al.[23] from Taibah University in Madinah and Al-Holy et al.[24] in the University of Hail in Al-Hail performed a questionnaire-based study and concluded as women had limited knowledge about FA supplementations in married and unmarried women. Maximum studies implemented in different cities in Saudi Arabia has found the similar confirmation as pregnant women have knowledge about FA supplementation and almost 50% of women were not achieving and further effects the NTDs for their neonates [14].

Outside Saudi Arabia, lower rates were reported in previous literature 76.59% reported hearing about FA and 93.89% took it during pregnancy [25]. A cross-sectional survey in Turkey found that 48.2% of the participants were aware that FA is necessary for the prevention of congenital anomalies. Even more significantly, although more than 88.2% of pregnancies were planned among women, only 14.2% of them reported using FA in the preconception period [26, 27], Maher et al. showed that nearly 98% of women reported hearing about FA [28]. Lower rates were reported in France as 36% of women never heard of folic acid and 82% were not aware of its benefits [29]. In Turkey, another survey by Köken, GüleNGül N et al. reported that (42.2%) of participants heard about folic acid and (48.2%) of them stated that folic acid could prevent birth defects [26].

Folic acid supplementation before pregnancy is known to significantly reduce the risk of having a baby with neural tube defects (NTDs). Therefore, it is important for women to be aware of the effects of folic acid supplementation before pregnancy. Starting FA supplementation before conception reduces the incidence of NTDs by 50–70% [30]. In our study, 75.2% of participants

know that it is necessary to take folic pills pre-pregnancy. A previous study reported lower rates as only 10.3% of 1,277 pregnant women reported taking folic acid during the periconceptional period [31]. Comparable results were reported by Köken, Güleğül N et al., only 14.2% of them stated that they had used folic acid in the pre-conception period [26]. Another study reported higher results as 66.41% of participants took it before pregnancy [27]. A high proportion of women worldwide, in both developed and developing countries, needs to be educated that FA should be taken before pregnancy and continued during the first three months after conception [32].

Folic acid supplementation was reported to have a significant positive association with education level, being employed, and planned pregnancy. However, other variables, including age, husband's age, husband's education and employment status, the number of prior pregnancies, economic satisfaction, and household food security, were nonsignificant factors affecting folic acid supplementation [33]. These findings are consistent with studies by Riazi et al. [34], Roth et al. [35], and De Santis et al. [36]. It has been shown that higher education levels in women can increase their awareness about the necessity of folic acid supplementation, and their understanding of the important period of folic acid supplementation [37].

Regarding factors associated with knowledge, our study indicated a significant association between knowledge of folic acid taking importance during pregnancy with marital status, number of children, and educational level of participants. Another study reported that knowledge was higher in older women, women in a couple and women with higher educational level [29].

Even with all these health benefits of folic acid supplementation, recent findings shows that higher population exposure to folic acid may have a negative impact on certain developmental and degenerative disorders. For example, there is currently a lot of focus on the role of folic acid fortification in increasing the risk of colon cancer. During pregnancy, a similar, possibly unanticipated negative effect has been observed. Synthetic folic acid inhibits human dihydrofolate reductase, resulting in unmetabolized folate in the bloodstream, which may mask irreversible pernicious anaemia caused by B12 deficiency. Low maternal vitamin B12 and high folic acid status during pregnancy may contribute to offspring insulin resistance and obesity [38].

## **Conclusion:**

The results of the current study affirmed good knowledge of folic acid supplementation usage during pregnancy among women in Arar, KSA. There was a significant association between knowledge of folic acid taking importance during pregnancy with marital status, number of children, and educational level of participants. Public health interventions among Saudi women in reproductive age to improve awareness of FA's roles before and during pregnancy are crucial to curtail birth defects.

**COMPETING INTERESTS DISCLAIMER:**

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

UNDER PEER REVIEW

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