

Awareness about folic acid intake amongst Saudi women of child bearing age in the Aseer region in prevention of neural tube defects in fetus

Ayoub Ali Alshaikh¹, Nimesh A², Saed Esam Mahmood^{3*}, Rishi Kr Bharti⁴, Mohammed Abdullah Alshehri⁵, Faris Ahmed Alasmre⁶, Sara Ali Almagrafi⁷, Lamees Mohssin Fageeh⁸, Nada Ali Alqahtani⁹, Raghad Abdullah Alarim¹⁰, Fatima Riyaz¹¹, Shehata Ferag¹²

¹*Assistant Professor, Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Saudi Arabia*

²*Assistant Professor, Department of Clinical Biochemistry, College of Medicine, King Khalid University, Abha, Saudi Arabia*

³*Professor, Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Saudi Arabia*

⁴*Assistant Professor, Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Saudi Arabia*

⁵*Intern, College of Medicine, King Khalid University, Abha, Saudi Arabia*

⁶*Intern, College of Medicine, King Khalid University, Abha, Saudi Arabia*

⁷*Intern, College of Medicine, King Khalid University, Abha, Saudi Arabia*

⁸*Intern, College of Medicine, King Khalid University, Abha, Saudi Arabia*

⁹*Intern, College of Medicine, King Khalid University, Abha, Saudi Arabia*

¹⁰*Intern, College of Medicine, King Khalid University, Abha, Saudi Arabia*

¹¹*Assistant Professor, Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Saudi Arabia*

¹²*Assistant Professor, Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Saudi Arabia*

Received: 17-09-2021 / Revised: 09-10-2021 / Accepted: 12-12-2021

Abstract

Background: Folic acid deficiency during pregnancy can lead to critical anomalies called neural tube defects (NTDs) in fetus. Though its prevalence is low (0.5 to 2 per 1000 births) yet efforts must be made to prevent its occurrence. Thus, objective of this study was to speculate the level of awareness of folic acid intake amongst Saudi women of child bearing age in the Aseer region in prevention of NTDs and to propose measures to prevent its occurrence. **Method:** A descriptive cross-sectional study was carried out on 700 women of child bearing age residing in various areas of Aseer Province. A self designed questionnaire form aiming to assess the awareness of folic acid was distributed to the participants and their responses were analysed. **Results:** Most of the women resided in villages/small town (54.1%) and were married (66.6%), educated up to graduation level (50.9%), non working (55.4%), non smokers (97.3%) and had monthly family income of less than 5000 Saudi Riyals indicating a relatively lower economic status. Only 18% women were aware that folic acid deficiency during pregnancy could lead to NTDs. Hardly 9.1% women were aware that folic acid should be taken 3 months before the pregnancy and during first 3 months of pregnancy. At the time of study although 53.9 % of study subject women were consuming folic acid supplements because of pregnancy, however 51.3 % women expressed their unwillingness to do so in future if they ever conceived. **Conclusion:** Awareness about folic acid intake amongst Saudi women of child bearing age in the Aseer region in prevention of NTDs in fetus was found to be low. Therefore formulating better health education strategies, support from healthcare staff, strengthening health care programs and frequent health visits/surveys are the proposed measures to ensure a higher level of awareness on the issue.

Keywords: Folic acid, Neural tube defects, awareness, Saudi Arabia, Pregnancy

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

*Correspondence

Dr. Saed Esam Mohmood

Professor, Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Saudi Arabia

E-mail: semahmood@gmail.com

Introduction

Folic acid is a vitamin belonging to the B-complex group of vitamins and is abundantly found in green leafy vegetables, broccoli, lentils, fruits etc and is required in minute amounts by the human body to carry out several important metabolic biochemical reactions which in turn brings about normal development and sustenance of body functions. One such function of folic acid which deserves attention is its role in the closure of neural tube during the fetal development. Folate acts as a cofactor for the enzymes involved in DNA and RNA biosynthesis[1]. Folate also acts a methyl group donor in the methylation reactions[1]. Any interruption in the synthesis of DNA or methylation reactions could prevent the proper closure of the neural tube in the fetus leading to neural tube defects such as anencephaly, spina bifida and encephalocele[1]. The prevalence of neural tube defects ranges from 0.5 to 2 per 1000 births in countries without folic acid supplementation[2]. A study has found the incidence of neural tube defect to be 0.78 per 1000 births in the Aseer region of Saudi Arabia[3]. Although the prevalence of neural tube defects is low yet these are highly fatal and babies with such defects die early due to infections that occur to the exposed brain tissue. In today's times every pregnancy is precious to the parents and the medical practitioners too want to do their best in order to prevent any such fatal disorders. Regarding the neural tube defects an interesting fact is that the occurrence of these disorders is easily preventable if the folic acid consumption could be adequately assured amongst the women of child bearing age. Although literature search has shown some studies that were carried out in the other regions (Sakaka, Hail, Riyadh) of Saudi Arabia regarding the awareness of folic acid intake during child bearing age but such studies are very few. Moreover the results of

Data Analysis

The responses from the subjects were analyzed and the results so obtained were tabulated in the form of percentages (Tables 1 and 2).

Table 1: Demographic data of subjects (N=700)

Variables	Response	Number of Subjects (N=700)	Percentage (%)
Age (Years)	15-25	65	9.3
	26-35	305	43.6
	36-45	245	35
	45-49	85	12.1
Living in	City	321	45.9
	Village/small town	379	54.1
Marital status	Single	116	16.6
	Married	466	66.6
	Divorced	83	11.9
	Widow	35	5
Educational level	Primary	65	9.3
	Intermediate	81	11.6
	Secondary	165	23.6
	Graduate	356	50.9
	Postgraduate	33	4.7
Occupation	Working	199	28.4
	Non-working	388	55.4
	Student	113	16.1
Smoking	Yes	9	1.3
	No	681	97.3
Parity	None	337	48.1
	One child	77	11
	Two children	119	17
	Three or more children	167	23.9
Family monthly income	Less than 5000 SAR	364	52
	5000-15000 SAR	211	30.1
	More than 15000 SAR	125	17.9

those studies have shown that a good level of awareness exists amongst the women of child bearing age residing in those regions[4-6]. However, to the best of our knowledge no such study was found to be carried out in the Aseer region of Saudi Arabia. Therefore, the objective of our study was to speculate the awareness about folic acid intake amongst Saudi women of child bearing age in the Aseer region of Saudi Arabia in prevention of neural tube defects and to propose some preventive measures that might be helpful to manage this problem.

Materials and methods

The study was a descriptive cross sectional study. An approval for the study was taken from the Institute's Ethics Committee for Scientific Research on Humans following which a written informed consent was taken from the subjects to be enrolled in the study. The study was carried out on women of child bearing age of 15-49 years residing in various areas of the Aseer Province of Saudi Arabia. Systematic random sampling technique was used for enrolling the subjects from areas namely Abha, Khamis Mushayt, Muhayil, Al Majardah, Ahad Rifaydah and Sarat Abidah belonging to the Aseer Province. Data was collected from approximately 115-120 subjects from each of the aforementioned areas of the Aseer province. Hence, a total of 700 women were recruited in this study from across the Aseer Province (the south western part of Saudi Arabia). A self designed questionnaire form aiming to assess the awareness of folic acid intake in preventing the neural tube defects in fetus during pregnancy was distributed to the participants of the study and their responses were recorded. The data from the subjects was compiled for further analysis. Forms with incomplete data were excluded from the study.

Table 2: Data obtained from subjects to ascertain their awareness about folic acid and its role in prevention of neural tube defects in fetus during pregnancy.

Variables	Responses	Number of subjects	Percentage (%)
What do you think is folic acid?	One of the minerals	132	18.9
	One of the acids	87	12.4
	One of the fat soluble vitamins (A, D, E, and K)	99	14.1
	One of the B complex vitamins	207	29.6
	Alternative to vitamin C	88	12.6
	I don't know	87	12.4
What do you think are sources of folic acid?	Fruits and vegetables	122	17.4
	Meat especially liver	158	22.6
	Cereals like rice	80	11.4
	Legumes like peas	58	8.3
	As tablets	225	32.2
	I don't know	57	8.1
What could folic acid deficiency lead to?	Neural tube defects (like spina bifida)	126	18
	Folic acid deficiency anemia	226	32.3
	Cleft lip and cleft palate	96	13.7
	I don't know	252	36
Have you ever heard about neural tube defects?	Yes	131	18.7
	No	569	81.3
Have you ever heard that folic acid prevents neural tube defects?	Yes	167	23.9
	No	533	76.1
When should folic acid be used to decrease the incidence of neural tube defects?	Before pregnancy only	77	11
	First 3 months of pregnancy	95	13.6
	3 months before pregnancy and during the first 3 months of pregnancy	64	9.1
	Throughout pregnancy	116	16.6
	I don't know	348	49.7
If you are married or after you get married and want to be pregnant then will you take folic acid?	Yes; because I believe in its importance	185	26.4
	Yes; but only for precaution even though I am not convinced about its importance	156	22.3
	No; because it's not important and many pregnant women didn't take it and still they gave birth to healthy children	359	51.3
Have you ever taken folic acid supplements?	Yes; because of pregnancy	266	38
	Yes; but for other reasons like folic acid deficiency anemia	89	12.7
	No	345	49.3
Are you currently under folic acid supplementation?	Yes; because of pregnancy	377	53.9
	Yes; but for other reasons like folic acid deficiency anemia	212	30.3
	No	111	15.8
Do you have history of children with neural tube defects?	Yes	12	1.7
	No	558	79.7

	I am not married	130	18.6
What is the source of your information about folic acid?	Primary care physicians	45	6.4
	Obstetricians and gynecologists	64	9.1
	Nutritionist	56	8
	Previous information	45	6.4
	Friends and Relatives	68	9.7
	Social media	87	12.4
	TV	77	11
	Internet and books	42	6
	During this study	69	9.9
	I don't remember	79	11.3
	I don't have any information about it	68	9.7

Results

The demographic data of the subjects has been shown in Table 1. The data analysis (Table 1) revealed that majority of women fell in the age category 18-25years (43.6%) and 36-45years (35%). The percentage of women residing in city (45.9%) and villages/small town (54.1%) was almost similar. Most of the women were found to be married (66.6%), educated up to graduation level (50.9%), non working (55.4%), non smokers (97.3%) and belonged to families having monthly family income of less than 5000 Saudi Riyals (SAR) indicating a relatively lower economic status. Amongst the study subjects it was also found that 48.1% subjects did not have children whereas rest of the subjects (57.9%) had one or more than one child.

The data in table 2 is showing the questions that were asked to the study subjects to ascertain their awareness about folic acid and its role in prevention of neural tube defects in the fetus during pregnancy. A response from the subjects if less than 50% for any question has been considered by us as low level of awareness amongst the study subjects. A response of 50-70% has been considered as a fair degree of awareness whereas a response of 71 -100% has been considered as a good level of awareness about the topic amongst the study subjects. It was found that only 29.6% of the women (207 women out of 700) were aware that folic acid is a type of B complex vitamin. Besides this it was found that 32.2% of the women believed that the dietary sources of folic acid is tablets whereas rest of the women believed that it could be present in other food items like meats, fruits, vegetables, cereals or legumes.

The data also shows that only 18% women were aware that folic acid deficiency during pregnancy could lead to neural tube defects in the fetus whereas 32.3% of the women believed that folic acid deficiency leads to anemia. Majority of the women (36%) admitted that they do not know what the folic acid deficiency might lead to. In fact just 18.7 % of the women had ever heard about the neural tube defects. The percentage of women who had heard about the role of folic acid in preventing neural tube defects was also very less (23.9%). In our study, it was also found that hardly 9.1% of child bearing aged women were aware that folic acid should be taken 3 months before the pregnancy and during first 3 months of pregnancy. More than half of the women (51.3%) expressed their unwillingness to take folic acid if they ever got pregnant and barely 26.4% of the total study group women were convinced to consume folic acid in future realizing its importance in pregnancy. The data showed only 38% of women had ever taken folic acid during pregnancy in past. At the time of study 53.9% women were taking folic acid supplements during pregnancy. This study showed that 12 women had history of having children with neural tube defects. Besides this, the data revealed that the subjects were aware about folic acid through the information available to them through the health care providers, friends, relatives, social media, internet and books.

Discussion

After having analyzed the results of this study, it is clear that the awareness amongst the study population of Aseer region of Saudi Arabia is low about the folic acid and its role in prevention of neural

tube defects. The results of our study are contrary to the results of the other studies that were conducted in other regions of Saudi Arabia like Sakaka, Hail and Riyadh wherein the level of awareness of folic acid amongst women of child bearing age was found to be high[4-6]. The probable reasons for low level of awareness about folic acid in our study population could be that approximately half of the subjects were residing in villages/towns (45.9% ; Table 1) wherein access and availability to the information and knowledge about folic acid could be a major concern. Moreover, regarding the education level, it was observed that approximately half of the study subject women studied only up to school (44.5%; Table 1) and probably that's why their knowledge and awareness about folic acid was limited. It was also observed in our study that more than half of the study subject women (55.4%, Table 1) were non working and perhaps had limited communication with other people of the society who might be aware of the folic acid and neural tube defects. Also, the lower economic background of majority of these women (52% women had family monthly income less than 5000SAR) might have predisposed these women to seek lesser extent of formal university level education, less medical help from health care providers or lesser affordability towards internet, books, social media, TV like facilities in order to have higher level of awareness about folic acid and its role in preventing neural tube defects.

Studies in literature have proven that low socio economic status is associated with increased risk of neural tube defects[7,8].

Besides this a study has also shown low maternal education is associated with increased risk of neural tube defects[8].

A study in literature has also shown that prevalence of neural tube defects in babies of rural women was much higher than that of urban women[9].

At the time of study although 53.9 % of study subject women were consuming folic acid supplements because of pregnancy (perhaps because they were recommended to do so by their health workers), however 51.3 % women expressed their unwillingness to do so in future if they ever conceived.

Therefore, considering that the level of awareness of folic acid in prevention of neural tube defects is low in our study subjects, we must work towards formulating the health education strategies in order to increase the spreading the awareness about folic acid and its role in preventing neural tube defects. An endeavor towards training more number of health care workers about folic acid and neural tube defects and deputing these health care workers in the community for spreading the awareness about folic acid would be of great help in addressing the issue. Besides this, engaging the medical students and interns for delivering health talks and campaigning in the community on a frequent basis might also help. Periodic health camps in the community for distributing folic acid tablets, paper pamphlets providing information on this health issue and for motivating the women in child bearing age to take folic acid supplements or folic acid rich food items too would hopefully increase the awareness on the issue. It must be ensured that the governments programs for prevention of neural tube defects and folic acid supplementation during pregnancy is being effectively implemented. Frequent and

periodic surveys in the community to consistently monitor the level of awareness on folic acid and its role in prevention of neural tube defects could also help. In due course of time, it is expected that factors like maternal education, urbanization, maternal socio economic status would further improve and that will lead to increased awareness about role of folic acid in prevention of neural tube defects in the Aseer region as well.

Conclusion

Awareness about folic acid intake amongst Saudi women of child bearing age in the Aseer region in prevention of neural tube defects in fetus was found to be low. Factors such as less education, low family income, non working status, residential place (village or city) are suspected to be the causal factors behind the low level of awareness. There is a great need to increase the awareness on this issue in the Aseer region. Formulating better health education strategies, support from medical staff, health care workers, strengthening health care programs and frequent health visits and surveys are proposed measures that can be taken up to ensure a higher level of awareness about folic acid to prevent neural tube defects in the Aseer region of Saudi Arabia.

References

1. Scott J, Weir D, Molloy A, McPartlin J, Daly L, Kirke P. Folic acid metabolism and mechanisms of neural tube defects. CIBA foundation symposium 1994;181:180–87
2. Forci, K., Bouaiti, E.A., Alami, M.H. et al. Incidence of neural tube defects and their risk factors within a cohort of Moroccan newborn infants. BMC Pediatr 2021; 21: 124
3. Asindi A, Al-Shehri A. Neural Tube Defects in the Asir Region of Saudi Arabia. Annals Saudi Med 2001; 21 (1-2): 26-29
4. Mervat AA. Awareness of Folic Acid Intake for Prevention of Neural Tube Defects among Women in Sakaka, Saudi Arabia. International Journal of Pharmacology 2019; 5 (2): 274-79
5. M. Al-Holy, A. Eideh, S. Epuru, D. Abu-Jamous and I. Ashankyty. Awareness of Folic Acid Intake among Women in the Childbearing Age in Hail Region—Saudi Arabia. Food and Nutrition Sciences 2013; 4 (1):49-55
6. AlDuraibi S, Al-Mutawa J. Knowledge and awareness of folic acid usage in Saudi pregnant women in Riyadh city from 2019-2020. J Family Med Prim Care 2020; 9(10): 5158-5164
7. Wasserman CR, Shaw GM, Selvin S, Gould JB, Syme SL. Socioeconomic status, neighborhood social conditions, and neural tube defects. Am J Public Health 1998; 88 (11): 1674-1680
8. Grewal J, Carmichael SL, Song J, Shaw GM. Neural tube defects: an analysis of neighbourhood- and individual-level socio-economic characteristics. Paediatr Perinat Epidemiol. 2009; 23(2): 116-124
9. Li, X., Zhu, J., Wang, Y. et al. Geographic and urban–rural disparities in the total prevalence of neural tube defects and their subtypes during 2006–2008 in China: a study using the hospital-based birth defects surveillance system. BMC Public Health 2013; 13: 161

Conflict of Interest: Nil

Source of support: Nil