

# Folic Acid and Neural Tube Defects - Knowledge and Practices of Mothers from Pakistan

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## Abstract

**Study objective:** To determine the knowledge and consumption practices of folic acid in Pakistani population.

**Methods:** This descriptive study was conducted in the outpatient clinic of Department of Obstetrics and Gynecology Unit III of Civil Hospital, Karachi, Pakistan from August, 2015 to December, 2015. During the study period 1500 pregnant women were interviewed. Patients' demographics were recorded and their knowledge regarding folic acid consumption was evaluated.

**Results:** Of all the patients interviewed, 648 (43.6%) patients had heard about folic acid at some point in their lives while only 216 (14.4%) reported periconceptual consumption of folic acid. The role played by folic acid in prevention of neural tube defects was known to only 276 (18.4%) patients. Counseling by physicians was considered to be the most important source of information by patients.

**Conclusion:** The present study demonstrates low knowledge about folic acid with most of the population being unaware about its role in prevention of neural tube defects. These results emphasize the need for intervention by government health agencies to increase awareness and intake of folic acid in women of childbearing age.

**Keywords:** Folic acid; Neural tube defects; Obstetrics; Civil hospital; Karachi; Pakistan

## Introduction

Folic acid deficiency affects the development of both cranium and spinal cord. The resulting defects are termed neural tube defects (NTD); which include spina bifida and anencephaly. In those who survive, there is increased risk of neurological complications including paralysis, hydrocephalus, Arnold Chiari type II and syringomyelia [1]. The risk of childbirth with NTD can be assessed by the maternal red cell folate levels in pregnancy [2].

The role of folic acid in prevention of NTD was first recognized by Hibbard and Smithells in 1965 [3]. Since then, multiple studies have reported the definitive role of periconceptual use of folic acid in prevention of NTD [4-7]. It has been demonstrated that up to 80% of such defects can be prevented if a woman adheres to the recommended guidelines of folic acid consumption [8,9].

In a woman who has given birth to a child with NTD, there is a risk of recurrence in 1 out of 25 cases. In primigravida this risk is 10 times lower; however, most of the NTD occur in low risk women [10]. The known risk factors for childbirth with neural tube defects are previous births with NTD, family history of NTD, low SES patients, obesity, fever in early stage of pregnancy and maternal history of diabetes or epilepsy [11-13].

Our aim is to determine the knowledge and practices of Pakistani women regarding folic acid consumption and factors governing their consumption habits. This study will be the first of its kind in our country as no such work has been conducted in the past.

## Materials and Methods

We conducted our study in the outpatient department (OPD) of Department of Obstetrics and Gynecology Unit III of Civil Hospital, Karachi. It is a 1900 bedded tertiary health care facility, which is affiliated with Dow University of Health

Sciences and is visited by a large patient population from the provinces of Sindh and Baluchistan. Most of the patients are uneducated and belong to lower socioeconomic class.

This cross sectional study was conducted during a 5-month period from August 2015 to December 2015, in which first 1500 patients were interviewed. All pregnant patients aged over 15 who were willing to take part in the study were included. Patients were approached by investigators in the outpatient department. Verbal consent was obtained before the interview. The answers were entered in a paper questionnaire. To discourage duplication of data, patients were asked if they had been previously interviewed by any investigator.

The questionnaire was based on a review of the literature and consisted of 17 questions. It consisted of five sections. Section 1 dealt with demographic information of the participants. Section 2 dealt with past pregnancies of patients and any history of neural tube defects. Section 3 included questions regarding awareness of the patient about folic acid and neural tube defects. Section 4 included queries regarding patient habits of folic acid consumption. Section 5 dealt with questions regarding source of patient information and counseling by doctors. The questionnaire was pre-tested on a group of 23 patients and produced similar results in test-retest. Internal reliability was determined by calculating the Cronbach's alpha, which came out to be >0.750 for all sections.

Data from the questionnaire was entered in SPSS (Statistical Package for the Social Sciences) version 14 for data analysis. Descriptive frequencies were extracted and Pearson's Chi square test was applied in order to assess the association of different factors with knowledge regarding folic acid. Factors were considered significant when P value was less than 0.05.

## Results

### Demographics

In our study, 1296 (86.4%) patients were below the age of 30 years. Sindhis were the most frequent visitors at the OPD with 324 (21.6%) patients. They were followed by 300 (20%) Muhajir patients and 282 (18.8%) Pathan patients. About 90% patients hailed from families of low Socio-Economic Status (SES) with monthly income less than PKR 10,000 (equivalent to US Dollars 112), with only 18 (1.2%) patients coming from families with monthly income greater than PKR 20,001 (equivalent to US Dollars 224). In our sample, 648 (43.2%) patients couldn't read or write their own names, whereas only 18 (1.2%) had studied beyond 12th grade. Of 1500 patients interviewed, 462 were pregnant for the first time (Table 1).

### Knowledge and Perceptions

Our study findings show that of all the women interviewed, 846 (56.4%) patients had never heard of folic acid. The statistically significant ( $P < 0.05$ ) factors, which contribute towards the knowledge of folic acid are age, ethnicity, SES, education and the number of times a woman has been

pregnant. Birth of infants with neural tube defects was reported by 12 (0.8%) patients.

Only 276 (18.4%) patients were aware of the role played by Folic Acid in prevention of NTD (Table 2). The ethnic group in which this awareness was most prevalent was Punjabis (37.5%). Of the 1500 patients interviewed, only 216 (14.4%) patients affirmed consumption of folic acid in current pregnancy. We found that the age of the patient, ethnicity, SES, education and the number of times a woman has been pregnant are significantly related with the consumption habits of folic acid ( $P < 0.05$ ) (Table 3).

**Table 1:** Demographical Data of 1500 female respondents.

Characteristics	Respondents
Age Groups	
10-20 years	330 (22%)
21-30 years	966 (64.4%)
31-40 years	192 (12.8%)
41-50 years	12 (0.8%)
Marital Status	
Single	9 (0.6%)
Married	1491 (99.4%)
Ethnicity	
Sindhi	324 (21.6%)
Balochi	138 (9.2%)
Muhajir	300 (20%)
Pathan	282 (18.8%)
Punjabi	192 (12.8%)
Other	264 (17.6%)
Household income (PKR)	
Below 10,000	1350 (90%)
10,000 to 20,000	132 (8.8%)
20,000 to 30,000	18 (1.2%)
Education	
Cannot read or write own name	648 (43.2%)
Madrasa	168 (11.2%)
Home School	24 (1.6%)
Up to 5th Grade	288 (19.2%)
Up to 10th grade	276 (18.4%)
Up to 12th grade	78 (5.2%)
Above 12th grade	18 (1.2%)

Most of the patients were also unaware about the correct period (85.2%) and the recommended daily dosage of folic acid (90.5%). Most patients (74.3%) who had heard about folic

acid were informed by their family physicians or doctor in locality, with counseling by obstetrician done in only 12.8% of the cases.

Information conveyed by friends and midwives accounted for only 11.9% and 0.9% cases, respectively.

**Table 2:** Knowledge about folic acid and its role in prevention of NTD.

Characteristics	Respondents
Prior knowledge of Folic Acid?	
Yes	654 (43.6%)
No	846 (56.4%)
Previous births with NTD	
Yes	12 (0.8%)
No	1452 (96.8%)
Don't know	36 (2.4%)
Folic acid prevents NTD	
Yes	276 (18.4%)
No	1224 (81.6%)
Folic acid consumption in current pregnancy	
Yes	216 (14.4%)
No	1284 (85.6%)
Correct timing of folic acid intake in order to prevent NTD	
Yes	222 (14.8%)
No	1278 (85.2%)
Correct dosing of folic acid intake in order to prevent NTD	
Yes	142 (9.4%)
No	1358 (90.53%)

**Table 3:** Knowledge about folic acid and its role in prevention of NTD.

Characteristics	Age		Ethnicity		Education		Income group
Knowledge of Folic Acid?	Oct-20	<0.001	Sindhi	<0.05	Illiterate	<0.001	<PKR 10,000
	21-30	<0.001	Balochi	NS	Madrassa	<0.05	PKR 10,000-20,000
	31-40	NS	Pathan	<0.001	Home school	<0.05	PKR 20,000-30,000
	41-50	NS	Punjabi	<0.001	Upto 5th grade	NS	
			Muhajir	<0.001	Upto 10th grade	<0.001	
			Other	NS	Upto 12th grade	<0.001	
					Above 12th grade	<0.001	
Past births with NTD's	Oct-20	<0.05	Sindhi	<0.05	Illiterate	<0.001	<PKR 10,000
	21-30	<0.001	Balochi	NS	Madrassa	<0.001	PKR 10,000-20,000
	31-40	<0.001	Pathan	<0.001	Home school	NS	PKR 20,000-30,000
	41-50	NS	Punjabi	NS	Upto 5th grade	NS	
			Muhajir	NS	Upto 10th grade	<0.05	
			Other	<0.001	Upto 12th grade	NS	

					Above 12th grade	NS	
Folic acid prevents NTD	Oct-20	<0.05	Sindhi	<0.001	Illiterate	<0.001	<PKR 10,000
	21-30	<0.001	Balochi	NS	Madrassa	<0.001	PKR 10,000-20,000
	31-40	NS	Pathan	<0.001	Home school	<0.05	PKR 20,000-30,000
	41-50	NS	Punjabi	<0.001	Upto 5th grade	NS	
			Muhajir	<0.05	Upto 10th grade	<0.001	
			Other	NS	Upto 12th grade	<0.001	
					Above 12th grade	<0.001	
Folic acid consumption	Oct-20	<0.001	Sindhi	<0.001	Illiterate	<0.001	<PKR 10,000
	21-30	<0.001	Balochi	<0.05	Madrassa	<0.001	PKR 10,000-20,000
	31-40	<0.05	Pathan	<0.001	Home school	NS	PKR 20,000-30,000
	41-50	NS	Punjabi	<0.001	Upto 5th grade	NS	
			Muhajir	<0.001	Upto 10th grade	<0.001	
			Other	NS	Upto 12th grade	<0.001	
					Above 12th grade	<0.001	
Correct timing of FA intake	Oct-20	<0.001	Sindhi	<0.001	Illiterate	<0.001	<PKR 10,000
	21-30	<0.001	Balochi	<0.001	Madrassa	<0.001	PKR 10,000-20,000
	31-40	<0.001	Pathan	<0.001	Home school	NS	PKR 20,000-30,000
	41-50	NS	Punjabi	<0.001	Upto 5th grade	<0.001	
			Muhajir	<0.05	Upto 10th grade	<0.001	
			Other	<0.05	Upto 12th grade	<0.001	
					Above 12th grade	<0.001	
Correct dosing of FA	Oct-20	<0.001	Sindhi	<0.001	Illiterate	<0.001	<PKR 10,000
	21-30	<0.001	Balochi	<0.001	Madrassa	<0.001	PKR 10,000-20,000
	31-40	<0.001	Pathan	<0.001	Home school	NS	PKR 20,000-30,000
	41-50	NS	Punjabi	<0.001	Upto 5th grade	<0.001	
			Muhajir	<0.05	Upto 10th grade	<0.001	
			Other	<0.05	Upto 12th grade	<0.001	
					Above 12th grade	<0.001	

**Table 4:** Counseling status.

Characteristics	Respondents
Source of information	
Friends	78 (11.9%)
Midwives	6 (0.9%)
Family Physicians	486 (74.3%)
Obstetrician	84 (12.8%)
Mass Media	0 (0%)
Counseling about folic acid on antenatal visit	

Yes	378 (25.2%)
No	1122 (74.8%)
Reason for not consuming folic acid	
Lack of social awareness	366 (28.5%)
Lack of medical advice on antenatal visit	636 (49.53%)
Financial constraint	42 (3.27%)
Didn't think it was important	150 (11.68%)
Not available in my area	90 (7%)

1122 (74.8%) patients denied the presence of any counseling practice at this tertiary health care center whereas 378 (25.2%) reported that they were advised by doctors at this center to consume supplements. Lack of counseling for intake of folic acid supplements, during antenatal care visits was attributed to be the cause for not consuming folic acid by 636 patients (42.4%). Lack of social awareness was held to be responsible for decreased awareness by 366 (24.4%) patients. 150 (11.7%) patients were oblivious to the importance of folic acid in preventing NTD (**Table 4**).

## Discussion

Our study is the first of its kind in our country which aims to document the knowledge of folic acid and its consumption in our population. Most of the patients interviewed (1296 or 86.4%) were below the age of 30 years. This can be attributed to the culture of early marriages which is prevalent in our country. The same age group has been reported as most frequent visitors in studies conducted in the regional countries [14,15].

Most of the patients in UAE (79.1%) had heard about folic acid [15]. However, we noticed that there exists a stark difference in our findings, where not even half of the patients had heard about folic acid. We believe that the educational level and socioeconomic conditions of the patients play a very important role in patient knowledge about folic acid. The same factors are also held responsible by Zhang et al. in their study [16]. Several regional studies indicate that most people interviewed knew about the importance of folic acid in prevention of NTD [16,17]. However, in our population sample, only 18.4% of patients were aware of its importance.

We noted less than satisfactory consumption of folic acid in our pregnant population, with only 14.4% affirming consumption of folic acid in every pregnancy. In contrast to other variables under study, the folic acid supplement intake habits of patients in our region differ widely from that of other countries in our region [15-20]. In our opinion this has been possible due to individual counseling practices of physicians in their respective areas. This is supported by our study also, which reports significant p value ( $p < 0.001$ ) for this relation. When Al-Hossani et al. interviewed patients in their study, less than 40% of the patients knew the time period in which folic acid plays a role in prevention of NTD. In our case, most of the

patients (81.6%) had no knowledge of the recommended dose and the correct period.

Counseling regarding folic acid supplementation is a major source of awareness in patients, as reported by Al-Hossani et al. and McGovern et al. in their studies [15,21]. The role played by paper media in increasing awareness about folic acid has been reported in Abu Dhabi, where 21.7% interviewees considered newspapers, magazines and books as source of information about folic acid [15]. However, in our setting, there is negligible role played by sources such as paper media and patients still rely on physicians for information regarding folic acid. 28.7% patients in our population emphasized on the need for availability of literature regarding folic acid which is both patients friendly and easily available.

## Limitations

The major limitations of our study are the failure to include patients from other hospitals who might not belong to low SES segment of the population and the collection of data in OPD of a single hospital. Moreover, this does not give an idea about the knowledge and practices of those women who deliver babies at their homes (usually rural areas).

## Conclusion

Our study represents the knowledge and attitude of pregnant women regarding folic acid. The results of our study are discouraging, since most of the people are unaware about folic acid and its role in prevention of NTD. This lack of knowledge is reflected in the consumption practices of our population. Regular counseling by physicians and obstetricians regarding folic acid supplement intake will improve the consumption practices of patients. We propose establishment of an awareness program regarding folic acid. This program should be entrusted with development of patient friendly literature which would promote folic acid usage in our population. There is room for more studies which will identify the most effective methods of increasing folic acid usage and extension of the same to the rural areas of our country.

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