

Original Research Article

Examining folic acid intake: a cross-sectional study of pregnancy-related practices

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ABSTRACT

Background: Folic acid supplementation during the periconceptional period is critical in preventing neural tube defects (NTDs) in the developing fetus. In Pakistan, a profound lack of awareness is seen regarding preventable pregnancy-related illnesses and the consequential high maternal and fetal mortality and morbidity rates. However, data from the surveys in the region of Sindh lacks inquiries regarding the baseline characteristics of the surveyed participants. Therefore, this study endeavoured to address this gap.

Methods: Between October 2022 and April 2023, a cross-sectional study was conducted at two major tertiary care hospitals in Hyderabad and Jamshoro, Pakistan. A total of 374 participants, chosen by non-probability consecutive sampling, comprised the sample size. The association of demographic variables and knowledge, attitude, and practice of consumption of folic acid during pregnancy was determined using the χ^2 test. A p value of less than 0.5 was considered statistically significant.

Results: The mean age of the participants was 26.4 ± 5.7 years. A total of 199 (53.20%) participants were literate, compared to 175 (46.79%) participants who were illiterate. Literate women fared better than illiterate women in all the metrics with a p-value of <0.001 and a Pearson correlation coefficient (r) of >0.7 . Moreover, folic acid was consumed by only 38% of pregnant women during the periconceptional period.

Conclusions: A substantial lack of knowledge regarding folic acid was found in the surveyed sample, significantly more marked in the illiterate faction. Additionally, the practice was rather unsatisfactory. However, the attitude remained encouraging.

Keywords: Folic acid deficiency, Neural tube defects, Pregnancy

INTRODUCTION

Bodily synthesis of deoxyribonucleic acid or DNA requires the availability of a group of compounds colloquially referred to as "folate".¹ The pharmaceutical analog of folate is known as "folic acid". Folate is utilized in the human body to produce tetrahydrofolic

acid (THF), which participates in synthesizing pyrimidines and purines.² The THF is also used by methionine synthase to produce methionine from homocysteine. Methionine provides "methyl" for numerous molecules. Various factors can contribute to a folate shortage in the body, including poor diet, malabsorption, and conditions that cause an increase in

the metabolic demand of the body, such as during pregnancy. Folate insufficiency happens to be at the root of abnormalities regarding the neural tube.³ Complex congenital malformations comprise neural tube defects (NTDs), including spina bifida, encephaloceles, and anencephaly.⁴ Maintaining adequate levels of folate in the mother is crucial to preventing the development of the disorder.^{5,6} Anti-folate agents such as valproate have repeatedly been shown to increase the risk of developing neural tube defects in the developing fetus.⁷ Some other established benefits of antenatal consumption of folic acid include the diminished risk of developing autism spectrum disorder (ASD) in the newborn. Similarly, the risk of the fetus developing low birth weight (LBW) decreases when folate levels in the pregnant mother are sufficient.

It is estimated that 0.3 million newborns worldwide are diagnosed with neural tube defects yearly.⁸ Populations in developed countries are generally less prone to develop folic acid deficiencies during pregnancies. Therefore, the prevalence of Neural tube defects is lower in the world's western regions than in Eastern or Asia.⁹ In Pakistan, anencephaly occurs in about 120 out of every 10,000 live births, while spina-bifida in about 7 out of every 10,000 live births.¹⁰ Supplementing the diet with folic acid in pregnancy also reduces the recurrence of NTDs.¹¹ In Pakistan, the prevalence of consumption of folic acid supplements during pregnancy is only around 40%.¹² There is also a lack of food fortification with multivitamins, including folic acid.¹³

Routine investigations for neural tube defects (NTDs) can be made with ultrasound as the screening test for the disease.^{14,15} A high maternal serum Alpha-fetoprotein correlates positively with the disease.¹⁶ An MRI is also performed in case of an inconclusive ultrasound.¹⁷ Maternal serum folate levels correspond well with the prevalence of the development of the disease as well.¹⁸

Therefore, a population-centered study signifying the periconceptional folic acid paradigm in Hyderabad, Sindh, may help generate awareness among the masses and simultaneously create a change in habit. This study assesses the knowledge, attitude, and practice of consuming folic acid in the periconceptional period by pregnant women visiting the outpatient department of gynecology and obstetrics, ward-I, LUH, Hyderabad, Sindh, Pakistan. Relevant authorities could then take the data into account when formulating healthcare policies.

METHODS

This descriptive and analytical cross-sectional study was conducted at two major tertiary teaching hospitals in Hyderabad and Jamshoro, Pakistan, between October 2022 and April 2023. The ethical approval of the study was obtained from the research ethics committee (REC) of the Liaquat University Hospital, Hyderabad (LUH): (IRB Ref No. LUMHS/REC/-141). Participants were

required to meet the inclusion criteria of the study which included every pregnant woman who was clinically stable and gave their consent. At the same time, those with debilitating, incapacitating illnesses were excluded. Raosoft sample calculator was employed to calculate the sample size, 374, using a CI of 95%. Data were collected using a non-probability consecutive sampling technique. A participant who could read and write her name in their mother tongue was considered literate. Data were gathered using a predesigned survey form translated into the local languages to circumvent any language barrier. Informed consent was obtained after explaining the study to the participants in their languages verbally and in written form. Our study also adheres to the principles outlined in the Helsinki declaration.

Two gynecologists from respective hospitals studied the questionnaire to assess its validity and applicability. We also conducted a pilot study on 70 patients to further validate the questionnaire. The questionnaire was divided into a total of four sections. Section one was concerned with the participants' biographical information and socioeconomic background. Questions relating to age, parity, residence, education, and occupation, among others, were inquired about in this section. In section two, questions were posed to evaluate the participant's information about folic acid and its consumption in the periconceptional period. The third section evaluated their attitudes toward folic acid usage during the periconceptional period. Lastly, questions about the practice were grouped in the fourth section. There were two categories of questions: open-ended and close-ended. For close-ended questions, each correct answer carried a point, while incorrect or ambiguous answers carried no points. For open-ended questions, the validity of the answers was left to the interviewer's judgment, and the points granted for such questions were 0, 1, and 2, which were interpreted as poor, fair, and good answers, respectively. The survey consisted of 13 questions excluding the questions concerning section one (biographical information and socioeconomic background). Eight questions were asked in the knowledge section, two in the attitude, and two in the practice section.

Data entry and analysis were done using BM Statistical Package for Social Sciences v.26.0. The scalar-scoring method was employed. The final score, termed, the "KAP score" was calculated for each participant after summing the scores for each section. A participant would receive a total of 18 points if they were successful in providing correct and complete answers to all of the 13 questions. A score equal to or more than 66% was considered a high or good score for each section. Between 33-66%, a medium or fair score; under 33%, a low or poor score. Lastly, categorical and continuous data were shown as frequencies, percentages, and mean standard deviation. An independent t-test was used to compare KAP scores and ascertain the significance level of the different

variables in the study. A p value of 0.05 or lower determined statistical significance.

RESULTS

Participant characteristics and pregnancy information are presented in Table 1.

Table 1: The socioeconomic profile of the participants (n=374).

Variables	Frequencies (%)
Age	26.4±5.7 years
Parity	
Primiparous	72 (19.20)
Multiparous	302 (80.84)
Residence	
Rural	193 (51.69)
Urban	181 (48.49)
Ethnicity	
Sindhi	101 (27.00)
Balouchi	85 (22.72)
Muhajir	60 (16.04)
Punjabi	47 (12.56)
Pashtoon	39 (10.42)
Others	42 (11.22)
Education	
Literate	199 (53.20)
Illiterate	175 (46.87)
Occupation	
Unemployed	347 (92.86)
Self-employed	21 (5.67)
Employed	6 (1.67)
Education of husband	
Illiterate	148 (39.68)
Literate	226 (60.48)
Occupation of husband	
Unemployed	13 (3.46)
Self-employed	141 (37.77)
Employed	220 (58.88)
Family system	
Nuclear	85 (22.78)
Joint	289 (77.27)
Monthly household income	
Rs.20,000-30,000	235 (62.98)
> Rs.30,000	139 (37.19)
Information source (n=158)	
Healthcare providers	119 (75.31)
Friends/family	38 (24.05)
Print/electronic media	1 (0.63)

Participant characteristics

A total of 374 women participated in this study. Most participants were aged between 20 and 30 years old and were literate. The mean age of the participants was 26.4±5.7 years. A majority of the participants belonged to

the rural areas of the region, were unemployed, and had a monthly family household income below 20,000 rupees (USD 66). One-fifth of the participants self-reported “family and/or friends” as their means of information acquisition regarding folic acid use in the periconceptional period.

Knowledge of consumption of folic acid

216 (57.77%) participants lacked any prior information about the use of folic acid during pregnancy. The mean score for knowledge regarding folic acid usage during pregnancy was 2.55±3.37 points (out of 12 points) or 21.25%. As many as 268 (71.65%) participants performed poorly in the knowledge section. Only 26 (6.95%) individuals received a good score, while 80 (21.39%) participants received medium or fair scores. With a p value of <0.001 and an R-value of 0.81, this metric was more significant in literate than illiterate women. The comparison between the two cohorts of participants who were taking folic acid supplementation and those who were not is presented in Table 2.

Attitude towards folic acid consumption: The mean score for attitude towards using folic acid before and during pregnancy was 2.29±0.8 points (out of 3 points) or 76.33%. A total of 60 (16.04%) individuals scored poorly on the attitude section, 129 (34.49%) people received a medium or fair score, and 185 (49.46%) participants received a good score. With a p value of <0.001 and a R-value of 0.72, this metric was more significant in literate than illiterate women.

Practice of folic acid usage

The average practice score for using folic acid was 0.96±1.27 (out of 3 points) or 32%. In the practice section, 233 (62.29%) participants received a low score, 63 (16.84%) received a medium or fair score, and 78 (20.85%) received a high score. With a p value of <0.001 and a R-value of 0.89, this metric was more significant in literate than illiterate women. Additionally, folic acid was consumed by 37.96% of the participants during the periconceptional period.

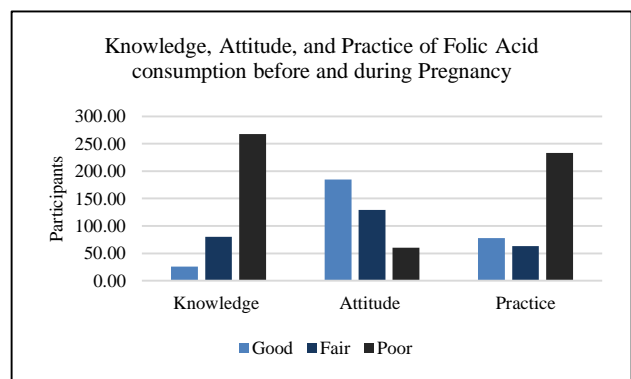


Figure 1: Graphical representation of KAP of the consumption of folic acid.

According to the participants' final KAP score of 18.70%, only 18.70% of the participants possessed an adequate level of knowledge regarding the use of folic acid in pregnancy, chose rational conduct (attitude), and

concurrently had taken the appropriate measures (practice) to address its insufficiency during pregnancy (Figure 1).

Table 2: Comparison of selected aspects between participants taking folic acid supplementation versus participants not taking folic acid supplementation.

	Participants taking folic acid (n=142) (%)			Participants not taking folic acid (n=232) (%)		
	Yes	No	Don't know	Yes	No	Don't know
Is it necessary to take folic acid before pregnancy?	86 (60.56)	5 (3.52)	51 (35.92)	36 (16.66)	98 (45.37)	82 (37.96)
Is it necessary to take folic acid during the first trimester?	88 (61.97)	5 (3.52)	49 (34.50)	20 (8.62)	173 (74.56)	39 (16.81)
Can folic acid reduce miscarriages and congenital disabilities?	46 (32.23)	6 (4.22)	90 (63.38)	14 (6.03)	113 (48.70)	105 (45.25)
Does the food we eat have folic acid in it?	50 (35.20)	17 (11.97)	75 (52.81)	28 (12.06)	69 (29.74)	135 (58.18)
	Poor	Fair	Good	Poor	Fair	Good
Why is it important to take folic acid during pregnancy?	99 (69.71)	41 (28.87)	2 (1.40)	214 (92.24)	12 (5.17)	7 (3.01)
Which foods are high in folate?	20 (14.40)	85 (59.85)	37 (26.05)	147 (63.36)	51 (21.98)	34 (14.65)
How much do a hundred tablets of folic acid cost?	80 (56.33)	20 (14.08)	42 (29.57)	186 (80.17)	9 (3.87)	37 (15.94)
Does overcooking reduce nutritional value?	83 (58.45)	6 (3.70)	69 (43.60)	108 (46.55)	78 (33.62)	46 (19.74)

DISCUSSION

The disastrous nature of the situation is evident by the majority of the participants displaying no prior knowledge of the consumption of folic acid in the periconceptional period. Poor understanding gives way to poor practice, as demonstrated by the fact that more than half of the participants had never utilized folic acid before the study. However, encouraging attitudes emerged from the study as nearly all participants acknowledged the significance of learning more about folic acid. This study shows literate women perform better than illiterate women across all three sections of knowledge, attitude, and practice concerning supplementation with folic acid during pregnancy. Despite an early gestational ultrasound scan, also sometimes called an "anomaly scan", being the standard of care in Pakistan, there are inadvertent delays in the diagnosis of NTDs.^{19,20}

In a poll, 18% of pharmacists claimed they avoid talking about folic acid with women of childbearing age because they think it is the responsibility of their healthcare providers. Yet, astonishingly, only 33% of the women surveyed said that their healthcare providers managed to inform them about folic acid.²¹ In this study, a comparable fraction of the participants said they had received information about folic acid from sources other than their healthcare providers (Table 1). A study from Rawalpindi, Pakistan, found that 43% of the participants

understood the importance of consuming folic acid in the periconceptional period.²²

There is ample evidence in the literature that suggests a direct connection between low maternal folate status and the frequency of NTDs in the developing fetus.^{23,24} It is recommended that all healthy pregnant women consume 400-600 micrograms of folic acid daily, whereas those at risk for health problems or who have a history of NTDs consume 5 mg daily.^{25,26}

The strengths of our study include the multi-centric study setting and the diverse socioeconomic and ethnic backgrounds of the included participants. The study's limitations comprised its relatively small sample size, utilization of self-reporting data collection methods, and the inclusion of only the out-patients. Additionally, the severity of folic acid deficiency was not assessed. In the future, larger studies may enhance the depth and reliability by adopting a mixed-methods approach and a longitudinal study design.

CONCLUSION

The assessed sample lacked understanding and practice of folic acid use in the periconceptional period, more pronounced among illiterate women. This study demonstrates that inadequate information and subpar practices plague women of childbearing age in the region.

This study also shows that a significant proportion of women of childbearing age acquire information on the use of folic acid through friends and family, therefore healthcare providers may employ such women consulting them as a means of information propagation and wider dissemination.

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Conflict of interest: None declared

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