

Knowledge and Use of Preconception and Antenatal Folic Acid Supplementation in Women with Pre-Existing Diabetes: A cross-Sectional Study from Lahore, Pakistan

Atif Munir,¹ Sidra Anwar,² Saniya Umer Draz,³ Aijaz Zeeshan Khan Chachar,⁴ Najeeb Ullah,⁵ Asma Afzal Khan⁶

ABSTRACT

BACKGROUND & OBJECTIVES: Pre-existing diabetes is a well-established risk factor for adverse fetal outcomes, including congenital anomalies such as neural tube defects. Preconception and periconception folic acid supplementation represent an evidence-based strategy for reducing these risks.

The objective of this study was to enhance awareness among both the general population and healthcare practitioners is essential to ensure the timely and appropriate use of folic acid for preventive purposes.

Methodology: This study aimed to assess the level of awareness, understanding, and utilization of folic acid among pregnant women with diabetes attending antenatal care, as well as its integration into routine clinical practice.

Results: Of the 50 participants, 14% were aware of folic acid supplements, 8% were familiar with the impact of folic acid supplements on birth defects. 2% of participants reported that their doctors had discussed the effects of diabetes on pregnancy with them. 46% of respondents reported currently taking folic acid supplements. 92% of participants were unaware of the role of folic acid in the prevention of neural tube defects in pregnancy with diabetes and the fact that diabetes increases the risk of neural tube defects in babies.

Conclusion: The findings underscore a significant need to strengthen awareness and educational initiatives targeting both the public and healthcare professionals, in order to optimize folic acid use and reduce the risk of adverse pregnancy outcomes associated with diabetes.

KEY WORDS: Folic Acid, Pre-Existing Diabetes, Knowledge

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INTRODUCTION

With 537 million adults currently living with diabetes worldwide, the projections indicate a 46% increase to 783 million by 2045. In 2021, 2,460,477.5 live births worldwide were affected by diabetes in women with preexisting diabetes.¹ The preconception period is crucial for women with diabetes to optimize their glycaemic control and reduce the risk of adverse pregnancy outcomes, including neural tube defects. Folic acid, a B-vitamin essential for DNA synthesis and methylation, has been shown to reduce the risk of neural tube defects when taken before and during early pregnancy. However, many women of reproductive age are not aware of the benefits of folic acid supplementation. Major congenital malformations are over two to three times more common in infants of diabetic mothers, potentially influenced by factors such as poor glycaemic control and abnormal folate metabolism, impacting nutrient levels, hormones, growth factors, cytokines, and DNA synthesis/structure. Periconceptional folic acid supplementation has shown potential in reducing anomalies, and deranged folate metabolism has been observed in pregnant women with preexisting diabetes, highlighting the need for further investigation.²⁻⁷

Internationally agreed recommendations for standardized care for women with preexisting diabetes planning pregnancy should include discussion and counselling regarding the increased risk of pregnancy complications associated with diabetes, preconception counselling addressing the significance of achieving an individualized safe range of glycaemic control, ideally less than 6.5% (48 mmol/mol) to reduce the risk of congenital anomalies and other foetal risks, contraception advice, and safe contraception until glycaemic control is optimized. Folic acid at a dose of either 400 or 500 mcg daily should be prescribed and started during the prenatal period. Review of current medications and changing/stopping potentially teratogenic medications, microvascular complication screening with retinal screening, urine microalbuminuria, and renal function tests.⁸⁻¹⁶

METHODOLOGY

This was a survey-based cross-sectional study using a questionnaire. The survey questionnaire was distributed among patients with preexisting diabetes attending gynaecology and endocrine clinics. The questionnaire questions were designed in a yes or no format for easy understanding and acceptability.

The study was conducted at the Diabetes and Endocrinology outpatient department of Omar Hospital, Lahore, Pakistan. It took one month to collect data.

Correspondence:

Dr Atif Munir
Assistant Professor, Department of Medicine & Endocrinology,
Fatima Memorial College of Medicine and Dentistry.
Email: atif113_2000@yahoo.co.uk

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All women with preexisting diabetes (both type 1 and type 2) attending Diabetes and Endocrinology outpatient department clinic during their first trimester of pregnancy in the study month were included and asked the questionnaire questions. Women with gestational diabetes were excluded.

Study Questionnaire:

The study questionnaire aimed to evaluate the awareness and understanding of the study participants regarding the association of neural tube birth defects with diabetes and the preventive role timely supplementation with folate can play in their prevention. The questionnaire also inquired if folate supplementation had been discussed with them by their healthcare professional and whether they are currently taking it. Answers were recorded as a yes or no.

RESULTS

Of the 50 participants, 14% were aware of folic acid supplements (Figure 1a), 8% were familiar with the impact of folic acid supplements on birth defects (Figure 1b). 2% of participants reported that their doctors had discussed the effects of diabetes on pregnancy with them

Table I: Study participant demographics

Age	Mean ± SD (28.86±5.21)
EDUCATION	FREQUENCY (%)
No education	2(4%)
Primary	5(10%)
Middle	7(14%)
Matric/O-levels	9(18%)
Inter/A-levels	7(14%)
Bachelor	18(36%)
Master	2(4%)
Duration of diabetes	Mean ± SD (2.6±2.39)

(Figure 1d). 46% of respondents reported currently taking folic acid supplements (Figure 1f). 92% of participants were unaware of the role of folic acid in the prevention of neural tube defects in pregnancy with diabetes and the fact that diabetes increases the risk of neural tube defects

Table II: Study results as response percentages

	YES	NO
QUESTION	Frequency (%)	Frequency (%)
1-Do you know about folic acid supplements?	7(14)	43(86)
2-Are you familiar with the impact of folic acid supplements on birth defects?	4(8)	46(92)
3-Have your doctor ever discussed the effects of diabetes on pregnancy with you?	1(2)	49(98)
4-Do you know diabetes increases the risk of neural tube birth defects?	4(8)	46(92)
5-Do you know the role of folic acid for prevention of neural tube defects in pregnancy with diabetes?	4(8)	46(92)
6-Are you currently taking folic acid?	23(46)	27(54)

in babies (Figure 1b & 1c).

Figure 1a: Knowledge about folate supplementation.

Figure 1b: Knowledge about folate supplementation and relation with birth defects

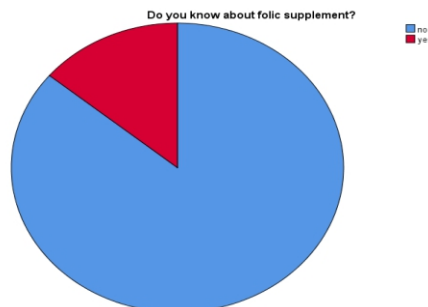
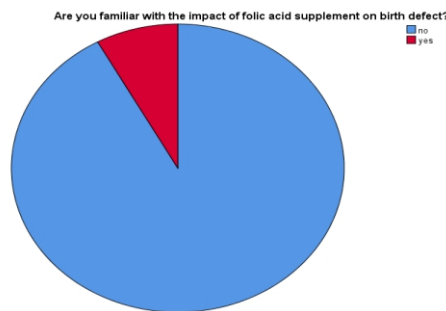


Figure 1c: Understanding about relation of diabetes with



neural tube defects

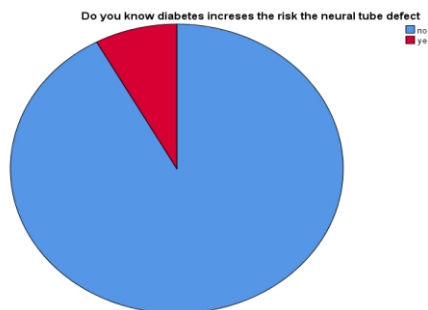


Figure 1d: Discussions by healthcare practitioners about diabetes and pregnancy

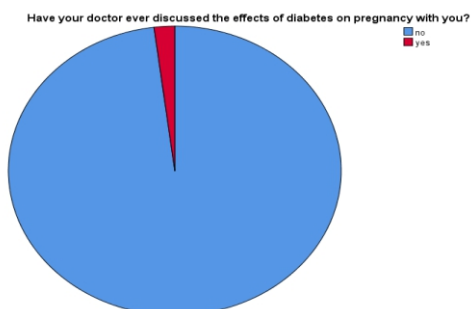


Figure 1e: Patient awareness about the link of neural tube defects in pregnancy with diabetes

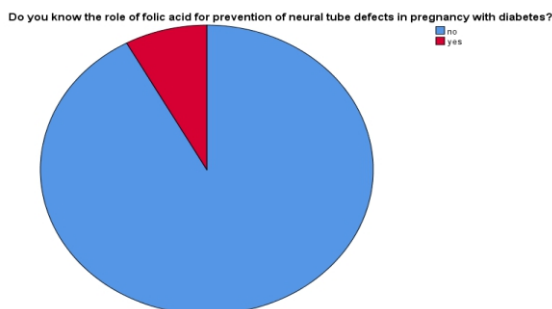
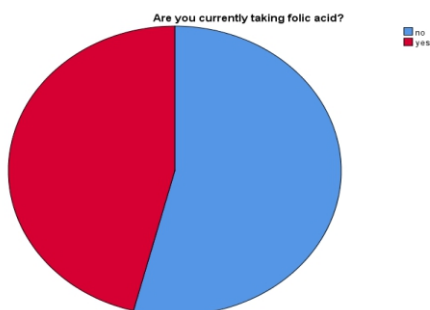


Figure 1f: Pregnant patients with pre-existing diabetes taking folate supplements



DISCUSSION

Our study highlights the need to increase both public and healthcare professional awareness and education about the benefits of folic acid supplementation in diabetic mothers during the preconception period and early pregnancy across all sectors of the population, irrespective of their education status.¹² Healthcare providers should prioritize the discussion of preconception care, folic acid supplementation, apart from the optimization of glycaemic control with women who are in the reproductive age group and have preexisting diabetes well in advance.^{13,14} Such awareness can translate into better practice of both prescribing and taking folic acid and hence prevent disabling congenital neural tube defects in babies born to mothers with preexisting diabetes.^{15,16} To create such awareness, we, as part of this study, have made a public and healthcare professional awareness poster both in English and Urdu, which can either be displayed in clinics/patient waiting areas and/or handed to patients at their clinic

appointment. Further research is needed to examine the barriers to folic acid supplementation in this population and to develop effective interventions to increase its use.

CONCLUSION

There are significant knowledge gaps among people with pre-existing diabetes about the link of preconception and during pregnancy use of folate supplementation to prevent neural tube defects in babies born to mothers with diabetes. The healthcare practitioners looking after women of childbearing age either with pre-existing diabetes planning pregnancy or going through pregnancy are either not aware of the scientifically proven benefits of folate supplementation or neither discussing nor prescribing it, which is putting such pregnancies at high risk of neural tube defects.

Ethical approval:

Ethical approval was taken from institutional review board of Omar Hospital & Cardiac Centre, Lahore, with the IRB number OHJR-IRB2025-01-MA Dated 12-03-2026.

Conflict of Interest:

Authors declare no conflict of interest.

Financial Disclosure:

None

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Authors' Contributions:

AM & SA: Conceptualization & study design.

AZKC, SUD: Data Collection and manuscript drafting.

AM, NU, AAK: Data Analysis and critical review.

SUD, SA, AZKC, AAK: Supervision & Manuscript drafting & proof reading.

All authors have read and approved the final version of the manuscript and are responsible and accountable for the accuracy and integrity of the work.

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1. Atif Munir
Assistant Professor of Medicine & Endocrinology,
Fatima Memorial College of Medicine and Dentistry, Lahore.
 2. Sidra Anwar
House officer of Medicine & Endocrinology,
Fatima Memorial College of Medicine and Dentistry, Lahore.
 3. Saniya Umer Draz
Post Graduate Resident of Pediatrics,
Fatima Memorial College of Medicine and Dentistry, Lahore.
 4. Aijaz Zeeshan Khan Chachar
Assistant professor Medicine,
Fatima Memorial College of Medicine and Dentistry, Lahore.
 5. Najeeb Ullah
Assistant professor Medicine,
Fatima Memorial College of Medicine and Dentistry, Lahore.
 6. Asma Afzal Khan
Assistant professor Pulmonology,
Fatima Memorial College of Medicine and Dentistry, Lahore.