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Knowledge and Preconception Care Seeking Practices among Reproductive-age Diabetic Women in Zambia

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ABSTRACT

Background and Objectives: Pre-existing diabetes is associated with poor pregnancy outcomes, yet much is unknown about knowledge of preconception care among diabetic women. Preconception Care (PCC) is the health interventions to women and couples before conception to reduce poor maternal and child health outcomes. The objective of this study was to examine the knowledge and preconception care seeking practices of diabetic women in the reproductive age.

Methods: The study was conducted at the University Teaching Hospital and Levy Mwanawasa General Hospital in Lusaka, Zambia. A cross-sectional hospital based study of 114 diabetic women between 15-45 years old was conducted between March and May 2017. Data were collected using structured questionnaires during face-to-face interviews. Data were entered using Microsoft Excel and then exported to SPSS version 20 for analysis. The Chi-square test was used to determine the association between knowledge levels and identified factors; these were further analyzed using binary logistic regression to determine the adjusted odds of poor knowledge.

Results: The findings showed that 52.6% of diabetic women that participated in the study had poor knowledge of preconception care. The identified independent factors associated with poor knowledge on preconception care were women receiving a level of education up to primary education only [Adjusted Odds Ratio (AOR) 4.54, 95% Confidence Interval (CI) (2.23, 9.27)], and women that had ≤ 1 year duration of diabetes diagnosis [AOR 3.21 95% (1.35, 7.65)]. About 67% of the participants with a history of being pregnant after diagnosis of diabetes did not seek preconception care.

Conclusion and Implications for Translation: The study indicated poor knowledge level as well as poor practice of seeking preconception care within diabetic women attending the University Teaching Hospital and Levy Mwanawasa General Hospital in Lusaka, Zambia. There is a need to explore the establishment of clinical guidelines and policies that will allow the dissemination of pregnancy related advice to diabetic women. As soon as women of the reproductive age were diagnosed with diabetes they should be aware of the PCC, and information dissemination through health centers is vital to encourage women to seek PCC when pregnancy is desired.

Keywords: Diabetes Mellitus • Diabetic Women. • Preconception Care • Reproductive Age Group • Knowledge • Practice • Zambia

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I. Introduction

Diabetes mellitus is a chronic metabolic disease characterized by hyperglycemia; it is a result of insulin deficiency, resistance or both.¹ Diabetes is categorized into type 1 diabetes, which is a result of insulin deficiency, and type 2 diabetes, which results from increased insulin resistance and insufficient compensatory insulin secretory response.¹ Despite the condition being common in adults, diabetes can affect individuals at any point of their lives, which includes females of reproductive age. Pre-existing diabetes, both type 1 and type 2, can lead to complications during pregnancy, in turn pregnancy can aggravate diabetes. This is associated to complex hormonal adaptations that work to ensure adequate glucose availability at the same time that there is a reduced insulin sensitivity, which contributes to hyperglycemia,^{2,3} ultimately leading to the exacerbation of the pre-existing diabetes during pregnancy. A diabetic woman planning to conceive needs to be aware of the implications of her condition on her pregnancy, her health, and that of the fetus. As such, preconception care is a very important topic for women of reproductive age.

PCC is the provision of biomedical, behavioral and social health interventions to women and couples before conception, with an aim at improving their health status, and reduce behaviors, individual and environmental factors that are associated with poor maternal and child health outcomes in both the short and long term.⁴ Preconception assessment of diabetes should focus on metabolic control and glycated hemoglobin (HbA1c), folic acid supplementation, vascular and lipid status, renal function, electrocardiogram, and fundoscopic examination.^{3,5,6} Additionally, it is recommended that women with type 2 diabetes using oral blood glucose lowering medications should begin insulin therapy.^{3,5,6}

Generally, pregnancy in women with either type 1 or type 2 diabetes is associated with increased risk of obstetric and neonatal complications, morbidity and mortality.^{2,7,8,9} The extent of the disease in women planning to get pregnant should be assessed, as complications such as nephropathy and retinopathy can be worsened by pregnancy which

are irreversible.^{2,3} Furthermore, literature reviews have outlined that diabetes is associated with poor pregnancy outcomes such as miscarriage, intrauterine fetal death, intrauterine growth restriction, stillbirth and perinatal death.^{2,3,7,8,9} In an environment of poorly-controlled diabetes, the developing fetus is at risk of many congenital malformations. A study by Sheffield et al., revealed 6.1% of infants born from diabetic mothers in their study had major congenital malformations.¹⁰ Another study by Macintosh et al. revealed that there was a 4.2-fold increase in the likelihood of developing a neural tube defect, and a 3.4-fold increase in likelihood of congenital heart defects in infants born to diabetic mothers.¹¹ Other congenital malformations in babies born to diabetic mothers include anencephaly, duodenal atresia, and renal agenesis.^{7,10,12,13} This in itself reduces the quality of life for the infant and is a contributing factor to infant morbidity and mortality. Congenital anomalies such as spina bifida can be reduced if folic acid is supplemented before the woman conceives.^{3,5,7} Furthermore, other complications such as preeclampsia, eclampsia, polyhydramnios and difficult delivery may be experienced,^{7,13,14} mostly in diabetics who are pregnant with poorly controlled diabetes.

Pregnancy with diabetes is a significant issue because the complications of diabetes both on the mother and the fetus result in a double burden. Peterson et al., suggest that provision of universal PCC reduces substantial health cost and burden associated with pre-gestational diabetes mellitus.¹⁵ Similarly, other studies have revealed that providing PCC to diabetic women before conception has health benefits and is a cost effective measure.^{16,17} Studies in different countries have shown that women with chronic medical conditions, including diabetes, have low knowledge levels concerning pregnancy and preconception care.¹⁸ With the prevalence of diabetes rising in low and middle income countries,¹⁹ the situation in Zambia is not any different, as a study in the capital, Lusaka, showed impaired glucose levels among 4.0% of the population.²⁰ Nevertheless, no studies have been conducted in Zambia to assess diabetic women's knowledge on PCC. Therefore, the objective of this study was to determine the knowledge and preconception care seeking practices

of diabetic women in the reproductive age group at two hospitals in the country.

2. Methods

A cross sectional study design was employed in the present study in order to assess the knowledge and practice towards PCC of diabetic women in the reproductive age group.

2.1. Study Sites

This study was conducted at two hospitals: 1) the University Teaching Hospital (UTH) and 2) Levy Mwanawasa General Hospital, both in Lusaka. With a 1,800 bed capacity, UTH is the highest referral hospital in Zambia and Levy Mwanawasa General Hospital is the second highest public hospital in Lusaka with a bed capacity of 159. The two hospitals are government owned; these hospitals cater for a very large population in Lusaka, Zambia, as well as referrals from other parts of the country, hence the reason for their selection in the study.

2.2. Sample Size and Sampling

The sample size was not predetermined as the targeted population was limited. Purposeful sampling was employed in which all participants that were eligible and consented participated in the study between March and May 2017. Eligible participants were women between 15-45 years of age and had been diagnosed with either type 1 or type 2 diabetes for at least one month. Also included in our study were pregnant women with pre-gestational diabetes mellitus. The participants were captured from the medical clinics during regular consultations, while other participants were captured from the medical and obstetrics inpatient wards. The marital status and obstetric history was not considered.

2.3. Ethical Approval

The study was approved by the Tropical Disease and Research Center Ethics Committee in February 2017 based at Ndola Teaching Hospital in Ndola, Zambia. Permission was obtained from the participating hospitals. Consent was obtained from participants that were 18 years and above. Both assent from teens and consent from parents were obtained for participants less than 18 years of age.

2.4. Data Collection and Analysis

A structured questionnaire was developed in English. The questions were administered through face-to-face interviews. Questions were set to gather information on the demographics, duration of diagnosis, knowledge on preconception care and the practices of seeking PCC for participants with a history of pregnancy. In assessing knowledge, a "yes" response was denoted as being correct, while "I don't know" or "no" incorrect. For the question when preconception care schedule should begin, a response that did not denote at least three months was considered incorrect. Data were entered using Microsoft Excel and then exported to SPSS Version 20, Armonk, NY: IBM Corp. for analysis.

Knowledge essential to PCC according to international guidelines^{3,6} were taken note of and the following questions were asked to assess if the participants were knowledgeable on the topic of PCC and then tested using the Chi-square along with a binary logistic regression analysis.

1. When is it necessary to visit your health center if you intend to get pregnant?
2. Is it necessary for the health personnel to have a say (advice) as to when you can get pregnant?
3. Can diabetes lead to complications in your pregnancy?
4. Can diabetes have implications on your baby (congenital malformations) apart from the baby getting the diabetes?
5. Can pregnancy make your current diabetes condition worse?
6. Can diabetes result in a complicated labor or delivery for you?
7. Is it important to have a medical check-up apart from checking blood sugars before you go on to get pregnant? (e.g. eye examination, kidney function test)
8. When should planning for pregnancy start?

To evaluate the level of knowledge on PCC, a cut-off score of 5 was set. Participants that gave an incorrect response to 5 or more questions were said to have poor knowledge on PCC.

Other questions were set to estimate the number of participants with a history of pregnancy after

being diagnosed with diabetes and engaged in seeking PCC before conceiving. This was used to assess the application or otherwise practice of seeking PCC:

9. How many pregnancies have you had after the diagnosis?

10. If your answer was one, two or more, how many of these pregnancies did you have a full medical check-up or seek advice from health care providers at the health center before getting pregnant?

11. How long before pregnancy PCC should start?

3. Results

A total of 114 reproductive age diabetic women participated in the study. In all, 114 questionnaires were distributed and returned indicating a 100% response rate. Table 1 shows the participants demographic information. Age groups 21-30 and 41-45 years old accounted for 65.0% of participants each representing a percentage of 32.5%. More than half of the participants (69.3%) were married; and less than half (29.8%) had diabetes for more than 5 years. In our study, 47.4% of the participants had up to secondary level of education. Out of the 114 women, 52.6% had poor knowledge and 89.5% of the participants gave an inaccurate answer regarding the question of when preconception care schedule should begin.

Table 2 shows significant associations between the duration of having diabetes, the level of education and having a history of pregnancy after the diagnosis of diabetes and knowledge on PCC ($p=0.009$, $p<0.001$ and $p=0.006$, respectively).

Table 3 shows that the independent variables of poor knowledge were level of education and duration of having diabetes. Participants with up to primary level of education were 4.54 times more likely to have poor knowledge on PCC than those with tertiary education [AOR 4.54, 95% CI (2.23, 9.27)]. Participants that had diabetes for one year or less were 3.21 times more likely to have poor knowledge on PCC than those that have had diabetes for more than five years [AOR 3.21, 95% CI (1.35, 7.65)].

Of all participants, 42 (36.8%) had one or more pregnancies after the diagnosis of diabetes. As shown

Table 1: Demographic characteristics of study population.

| Demographics | N (%) |
|---|-----------|
| Age (years) | |
| 15-20 | 7 (6.1) |
| 21-30 | 37 (32.5) |
| 31-40 | 33 (28.9) |
| 41 + | 37 (32.5) |
| Marital status | |
| Married | 79 (69.3) |
| Divorced | 3 (2.6) |
| Widowed | 4 (3.5) |
| Single | 28 (24.6) |
| Level of education | |
| Up to primary | 37 (32.5) |
| Secondary | 54 (47.4) |
| Tertiary | 23 (20.2) |
| Occupation | |
| Employed | 26 (22.8) |
| Self-employed | 39 (34.2) |
| Unemployed | 33 (28.9) |
| Student | 16 (14.0) |
| Duration of having diabetes (years) | |
| ≤1 | 24 (21.1) |
| 1.1-3 | 30 (26.3) |
| 3.1-5 | 26 (22.8) |
| >5 | 34 (29.8) |
| History of pregnancies after Diabetes Mellitus (DM) diagnosis (type 1 or 2 DM) | |
| None | 72 (63.2) |
| One or more | 42 (36.8) |

in Table 4, 28 (66.7%) of the participants with a history of pregnancy after the diagnosis of diabetes did not seek preconception care, while the 14 (33.3%) that did, had an idea of preconception care basically involved checking and ensuring that their glycemic control was normal. The reasons for the practice of seeking PCC are shown in Table 4, with the majority (64.3%) of participants that did not seek PCC stating that they did not know they were supposed to seek PCC, while the majority (57.2%) of participants that did seek PCC stated that they were assured that even with their condition they would have a normal pregnancy.

Table 2: Factors associated with knowledge of preconception care (PCC)

| Factor | PCC knowledge | | P value |
|---|---------------|--------------|---------|
| | Poor (%) | Adequate (%) | |
| Age (years) | | | |
| 15-20 | 6 (85.7) | 1 (14.3) | 0.136 |
| 21-30 | 15 (40.5) | 22 (59.5) | |
| 31-40 | 18 (54.5) | 15 (45.5) | |
| 41+ | 21 (56.8) | 16 (43.2) | |
| Marital status | | | |
| Married | 40 (50.6) | 39 (49.4) | 0.416 |
| Divorced | 3 (100.0) | 0 (0.0) | |
| Widowed | 2 (50.0) | 2 (50.0) | |
| Single | 15 (53.6) | 13 (46.4) | |
| Level of education | | | |
| Up to primary | 30 (81.1) | 7 (18.9) | <0.001* |
| Secondary | 24 (44.4) | 30 (55.6) | |
| Tertiary | 6 (26.1) | 17 (73.9) | |
| Occupation | | | |
| Employed | 11 (42.3) | 15 (57.7) | 0.131 |
| Self-employed | 17 (43.6) | 22 (56.4) | |
| Unemployed | 22 (66.7) | 11 (33.3) | |
| Student | 10 (62.5) | 6 (37.5) | |
| Duration of having diabetes (years) | | | |
| ≤ 1 | 19 (79.2) | 5 (20.8) | 0.009* |
| 1.1-3 | 17 (56.7) | 13 (43.3) | |
| 3.1-5 | 12 (46.2) | 14 (53.8) | |
| >5 | 13 (35.3) | 22 (64.7) | |
| Number of pregnancies after DM diagnosis (type 1 or 2) | | | |
| None | 45 (62.5) | 27 (37.5) | 0.006* |
| One or more | 15 (35.7) | 27 (64.3) | |

*Significant factors

4. Discussion

The study explored the knowledge and preconception care seeking practices of diabetic women of reproductive age. The findings revealed that 52.6% of the participants had poor knowledge on PCC. These results are similar to the findings in other studies on diabetic women which have described participants as having inadequate knowledge.^{18, 21, 22, 23} Contributing factors to this are that most patients were not

Table 3: Independent factors associated with poor knowledge on preconception care

| Factor | AOR (95% CI) |
|--|--------------------|
| Education level | |
| Up to primary | 4.54 (2.23, 9.27)* |
| Secondary | 0.73 (0.41, 1.31) |
| Tertiary | 1** |
| Duration of having diabetes (years) | |
| ≤ 1 | 3.21 (1.35, 7.65)* |
| 1.1-3 | 0.97 (0.47, 2.02) |
| 3.1-5 | 0.92 (0.43, 1.95) |
| >5 | 1** |

AOR (95% CI): Adjusted odds ratio at 95% confidence interval. *significant finding, **reference variable

aware of congenital complications that may result from entering pregnancy with suboptimal glycemic control and how long before pregnancy PCC they should have started. Assessing the response to the question “how long before pregnancy PCC should start,” our study revealed that 89.5% participants believed less than 2 months of optimal glycemic control was necessary. No other study has revealed similar findings which is important to note as pre-pregnancy planning in diabetic women should start for at least 3 months before conception.^{3,6} This is an important point to take into consideration because hyperglycemia itself is teratogenic.³

Assessing the factors associated with poor knowledge on PCC, the present study showed that the independent variables associated with poor knowledge on PCC were up to primary level of education and having diabetes for 1 year or less. Participants with up to primary level of education were 4.54 times more likely to have poor knowledge on PCC than those with tertiary education. Participants that had diabetes for 1 year or less were 3.21 times more likely to have poor knowledge on PCC than those that have had diabetes for more than 5 years.

Also noted in this study, was the practice seeking behavior in participants with a history of being pregnant after being diagnosed with diabetes. It was found that 42 (36.8%) of the participants had one or more pregnancies after diagnosis of diabetes.

Table 4: The practice of seeking preconception care (PCC) for participants with a history of pregnancy after diagnosis of diabetes

| Did you seek PCC ? | Frequency N (%) | Reason | N (%) |
|--------------------|--------------------|---|------------|
| Yes | 14 (33.3%) | The health personnel explained to me about the need to see the doctor before getting pregnant | 3 (21.4%) |
| | | I knew about the need to seek PCC through the print or electronic media | 3 (21.4%) |
| | | I was assured that even with my condition I would have a normal pregnancy if assessed | 8 (57.2%) |
| No | 28 (66.7%) | I did not know I was supposed to seek PCC | 18 (64.3%) |
| | | I was afraid they would discourage me from conceiving | 1 (3.6%) |
| | | I did not think it was necessary | 9 (32.1%) |

Of these, 66.7% did not seek PCC. This is similar to a study by Holing et al., that showed that 41% of diabetic women having unplanned pregnancies,²⁴ while Amal et al., revealed that 100% of diabetic women that participated in their study had unplanned pregnancies.²¹ The current study's finding was that of those that did not engage in the practice of seeking medical evaluation, majority (64.3%) reported not having known they were supposed to seek PCC. This opens an area of possible research exploring the approach of health care providers in counseling of diabetic women concerning pregnancy. On the other hand, of those that did seek PCC, the majority (57.1%) attributed their seeking behavior to having being assured that even with their condition they could still have a normal pregnancy. The latter finding is similar to that of Holing et al., who found that most diabetic women that were discouraged from getting pregnant, had opted to have unplanned pregnancies.²⁴ Another point worth noting is that for the women that reported to have had sought PCC, they interpreted this to be an evaluation of their glycemic control. Therefore, this concept should be corrected as the medical evaluation for diabetic women before getting pregnant should focus on metabolic control and HbA1c, folic acid supplementation, vascular and lipid status, renal function, electrocardiogram, and fundoscopic examination.^{3,5,6} Additionally, women with type 2 diabetes using oral blood glucose lowering medications should begin insulin therapy.^{3,5,6} Yet again this necessitates the need to explore the health care providers approach in their management of diabetic women and pregnancy.

The present study has shown the need for a more intensive approach on educating diabetic women on PCC in ways they understand best. Complications of entering pregnancy with suboptimal glycemic control both on the mother and the developing fetus must be well explained. Such educational talks should start as soon as the diagnosis is made for patients in the reproductive age group. The strength of the current study was the privilege to obtain data from diabetic women directly through the interviews.

Study limitations were that a lengthy duration of collecting data would have possibly captured more participants, hence increasing the sample size. In addition, purposeful sampling was employed to select the two highest public hospitals in Lusaka; this was also used to select participants as the target population was limited and thus limits generalizability of the study findings.

5. Conclusion and Implications for Translation

The study revealed the need to improve knowledge on PCC in diabetic women, as a large percentage of the women in our study had poor knowledge on the subject. Besides disseminating information aimed at improving the knowledge levels, health centers need to put in place measures that will encourage women to engage in the practice of seeking PCC, given that the majority of the women with a history of pregnancy after the diagnosis of diabetes did not seek PCC. Further, general preconception education during antenatal services should be considered.

Compliance with Ethical Standards

Conflict of Interest: The authors declare that they have no conflicts of interest. **Financial Disclosure:** Nothing to declare. **Ethics Approval:** The study was approved by the Tropical Disease and Research Center Ethics Committee, and the participating hospitals permitted the conduct of the study. **Funding:** The study was funded by the Government of the Republic of Zambia Ministry of Education, through the Students' Bursaries Committee.

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Disclaimer: None.

Key Messages

- ▶ Diabetic women had low knowledge on preconception care (PCC), therefore there is a need to disseminate information and pregnancy-related advice to these group of patients.
- ▶ The practice of seeking PCC was poor; there is further need for health centers to put in place measures that will encourage women to seek PCC.
- ▶ Pregnancy related advice should start as soon as the diagnosis of diabetes is made for patients of reproductive age.

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