Pre-conception care in diabetes: Where do we stand?

Pushpakala Maharajan, Kirsten Duckitt, Syma Shah, Janet Liddie

Article points

1. Pregnancy in diabetes carries a high risk, with increased morbidity for both mother and baby. Pre-conceptional care can improve outcomes in these pregnancies.
2. A dedicated pre-conception clinic is one way forward to reducing diabetes-related pregnancy complications; however, there are limitations as many of these pregnancies may be unplanned.
3. This study revealed that local pre-conception advice could be refined to improve pregnancy outcomes in diabetes.

Key words
- Glycaemic control
- Pre-conception care
- Unplanned pregnancy

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Women with diabetes who are contemplating pregnancy should be aware of good glycaemic control, both before conception and during pregnancy, as poor control is associated with increased risk of miscarriage, congenital malformation, stillbirth and neonatal death. The NICE (2008) guideline on diabetes and pregnancy made several recommendations regarding the content and extent of pre-conception advice that should be given to women with diabetes. The authors of this article aimed to explore the pre-conception advice that women with type 1 or type 2 diabetes receive prior to pregnancy.

Approximately 650 000 women give birth in England and Wales each year, with 2–5% of these pregnancies involving women with diabetes. Of these, 87.5% are pregnancies complicated by gestational diabetes, 7.5% of which are in women with type 1 diabetes and the remaining 5% are in women with type 2 diabetes (NICE, 2008).

Adverse outcomes, such as miscarriage and congenital anomalies, are related to poor glycaemic control before and during early pregnancy (Ray et al, 2001). There is evidence that babies of women with type 1 diabetes who attend multidisciplinary pre-pregnancy counselling show significantly fewer major congenital malformations compared with infants of non-attending mothers without diabetes (Kitzmiller et al, 1991).

Women with diabetes should be made aware of the risks that diabetes confers on pregnancy, including higher rates of miscarriage, congenital anomalies, macrosomia, pre-term labour, polyhydramnios, pre-eclampsia, induction, intervention in labour, shoulder dystocia, stillbirth, Caesarean section and postpartum haemorrhage (Confidential Enquiry into Maternal and Child Health [CEMACH], 2005). Women should be informed of the potential risks for the infant including hypothermia, hypoglycaemia, hyperbilirubinaemia, hypocalcaemia, hyperkalaemia, hyperviscosity synedrome, congenital anomalies and stillbirth (CEMACH, 2005).

Studies, comparing pregnancy outcomes of women with diabetes who received antenatal care as opposed to both pre-conceptual care and antenatal care, found that HbA_{1c} levels, as a retrospective marker of glycaemic control and spontaneous miscarriage rate, were lower in those who received both pre-conceptual care and antenatal care (Rosenn et al, 1991).

Aims

This study aimed to explore the pre-conception advice that women with type 1 or type 2 diabetes receive prior to their pregnancy in the authors' locality.

Methods

The study was a prospective analysis of women seen in the joint diabetes obstetric antenatal clinic. The questionnaire was designed and validated by the authors and included questions that reflect NICE (2008) recommendations concerning pre-conception care for pregnant women with diabetes (*Box 1*). They were distributed to pregnant women with diabetes between 2007–2008. The authors included women who had type 1 or type 2 diabetes, but excluded women with gestational diabetes.

The intention was to assess pre-conceptual care offered to the whole group (n=20); however, information was only available for 15 individuals. The remaining five were not contactable, nor did they attend the clinic during the study period.

The unit at the Milton Keynes general hospital has an annual delivery rate nearing 4000 and the joint diabetes clinic registers between 15 and 25 women with diabetes annually.

Results

The data show that 46.6% (7/15) women had type 1 diabetes and the remaining 53.3% (8/15) had type 2 diabetes. Women with type 2 diabetes were predominately on metformin (66.6% [10/15]) followed by diet control in only 13% (2/15). Forty per cent (6/15) of the women felt that the risks of the condition on pregnancy were explained, and 66.6% (10/15) of them felt that risks of diabetes on the infant were explained before conception. The majority of women (87% [13/15]) felt that macrosomia was the most discussed complication during their appointments with their healthcare professionals. The vast majority (93.3% [14/15]) knew that good glycaemic control is essential for a better pregnancy outcome.

Only 33.3% (5/15) of women had taken the recommended daily dose of folic acid (5 mg), and 46.6% (7/15) did not recall the dose they were taking in their first trimester. This is in spite of the NICE (2008) recommendation that women with diabetes who are contemplating pregnancy should be advised to take folic acid (5 mg/day) until 12 weeks' gestation to reduce the risk of having a baby with a neural-tube defect. Of this group, only one-third (5/15) started taking folic acid prior to pregnancy, while 40% (6/15) started folic acid when their pregnancy test was positive, and a 26% (4/15) started folic acid a few weeks after their pregnancy test was positive.

Twenty per cent (3/15) of the women with diabetes felt that their drugs were not reviewed in early pregnancy, 33.3% (5/15) felt that they were reviewed and changed, 40% (6/15) felt they were reviewed and not changed, and one woman did not remember what was done. Sixty per cent (9/15) continued to use metformin during their pregnancy for optimal blood glucose control, and 40% (6/15) had metformin changed to alternatives.

Most women (93% [14/15]) were neither on statins nor angiotensin-converting enzyme inhibitors prior to pregnancy: the woman who was on them had them reviewed and stopped prior to becoming pregnant. Further, the authors noted 66.6% (10/15) of the women had a retinal assessment within a year of getting pregnant and 46.6% (7/15) had had their renal function estimated before becoming pregnant. Pre-conception advice was offered by a GP to 20% (3/15), by a community midwife to 20% (3/15) and by DSNs to 13% (2/15) of respondents.

More than half (53%) felt that information leaflets and dedicated clinics would have been helpful. One woman said: "I would like to know more about pre-conceptual care. Provision of leaflets regarding this would be helpful, especially for diabetic mothers who don't know what pre-conception care is all about in the first place."

Discussion

Pre-conception advice is key for better pregnancy outcomes. Women with poor glycaemic control during the period of organogenesis – which is almost complete by 7 weeks post-conception – have a high incidence of spontaneous miscarriage and of fetuses with congenital anomalies (Temple et al, 2002). Thus, seeing these women before conception and offering them the correct advice cannot be under estimated. This also enables lifestyle changes, weight reduction and drug modification, which may optimise glycaemic control.

Studies have invariably shown that the occurrence of congenital malformations in infants

Page points

1. The questionnaire was designed and validated by the authors and included questions that reflect NICE (2008) recommendations concerning pre-conception care for pregnant women with diabetes.
2. Seven women (46.6%) had type 1 diabetes and eight (53.3%) had type 2 diabetes.
3. Forty per cent (6/15) felt that the risks of the condition on pregnancy were explained, and two-thirds felt that risks of diabetes on the infant were explained before conception.
4. Only 33.3% (5/15)of women had taken the recommended daily dose of folic acid (5 mg), and 46.6% (7/15) did not recall the dose they were taking in their first trimester.

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Box 1. Pre-conception care for women with diabetes (Questionnaire).

1. Which type of diabetes do you have?
❒ Type 1 ❒ Type 2

2. What diabetes medication were you on before becoming pregnant?
❒ Diet ❒ Gliclazide
❒ Metformin ❒ Insulin
❒ Other, please specify

3. Were the risks to yourself explained to you if becoming pregnant?
❒ Yes ❒ No
❒ Cannot remember

4. Were the risks to your baby explained to you if becoming pregnant?
❒ Yes ❒ No
❒ Cannot remember

5. If the risks were explained to you, please tick the appropriate box:
❒ Large baby ❒ Extra fluid
❒ Shoulder dystocia ❒ Preterm labour
❒ Recurrent infections ❒ Preeclampsia
❒ Others

6. Were you informed about the importance of strict blood sugar control?
❒ Yes ❒ No

7. Were you started on folic acid?
❒ Yes ❒ No

8. If yes to Q7, do you know the dosage?
❒ 400 µg ❒ 5 mg
❒ Don't know

9. If yes to Q7, when did you start taking the folic acid?
❒ Before pregnancy ❒ A few weeks after positive pregnancy test
❒ Just when test was positive ❒ Cannot remember

10. Was your diabetes medication reviewed or changed before pregnancy?
❒ Not reviewed ❒ Reviewed but not changed
❒ Changed ❒ Cannot remember

11. Were you on ACE inhibitors or statins before becoming pregnant?
❒ Yes ❒ No

12. If yes to Q11, were they stopped?
❒ Yes ❒ No

13. Since becoming pregnant were you referred for retinal (eye) assessment if you have not had one before?
❒ Yes ❒ No

14. Was your kidney function assessed within the year before pregnancy?
❒ Yes ❒ No

15. Who did the pre-conception counselling?
❒ GP ❒ Consultant
❒ Midwife ❒ Other
❒ None

16. Would it have been useful for you to have an information leaflet about pre-conception care?
❒ Yes ❒ No

of women with diabetes is higher than in infants of women without the condition. The overall risk of one or more major anomalies is doubled, and the risk of congenital heart disease or a central nervous system malformation is increased approximately three-fold, in infants born to women with diabetes (Macintosh et al, 2006). This emphasises the need for prepregnancy counselling and advice, and the need for tighter glycaemic control prior to pregnancy. Pearson et al (2007) found that women who conceived with an optimal HbA_{1c} level had five-times lower odds of an unfavourable outcome compared with those with suboptimal levels. As in many other studies, poor glycaemic control before conception correlates with perinatal death, still birth and congenital anomaly (Pearson et al, 2007).

Few women achieve the National Service Framework for diabetes (DH, 2001) HbA_{1c} target of 7% (53 mmol/mol) at the time of conception. This accentuates the responsibility of healthcare professionals in primary and secondary care with regard to the care of these women who are faced with challenges ahead in the event of suboptimal glycaemic control. Tighter control is sometimes achieved by changing the dose of current medication or adding new medications, although this has to be balanced with an increased risk of hypoglycaemia.

Women with long-standing diabetes should be aware of the importance of optimal glycaemic control regarding complications in pregnancy. Individuals in this study, however, felt that they needed more information regarding the risks involved in their pregnancy and for the infant following delivery. Conversely, Griffiths et al (2008) identified that formal prepregnancy counselling can create anxiety in some women, thus creating an additional burden. The relatively high risk of adverse outcome for women with diabetes, and the paucity of health strategies in reducing this risk, signify that robust methods are urgently needed in understanding the pathophysiology of the condition and its course in pregnancy.

The role of folic acid in reducing the risk of congenital anomalies, and the optimal dose required, has, in the authors' opinion, always been understated. Primary prevention of birth defects by adequate periconceptional folic acid supplementation is a major public health opportunity, and has wide implications in reducing both mortality and morbidity due to birth defects and several adult diseases (Hall and Solehdin, 1998). The present study shows that the majority of women in the authors' area were aware of the need for folic acid in pregnancy, but did not realise the importance of starting folic acid at the right dose *prior* to conception. Therefore, one of the key elements in pre-conception care is to reinforce the importance of intake of folic acid before and after conception. To achieve this, the pregnancy needs to be planned.

Systemic conditions, such as diabetes, tend to worsen with pregnancy (CEMACH, 2005). Stringent methods in assessing these conditions should be in place before women with diabetes contemplate pregnancy. Diabetic retinopathy worsens in some women during pregnancy, although it is not likely to develop de novo in women with no retinopathy before pregnancy (Star and Carpenter, 1998). The present study indicates that eye checks were systematically done at the primary care level, which is encouraging. The presence of diabetic retinopathy and its acceleration are a concern both for fetus and mother.

Microalbuminuria and overt nephropathy are associated with an increased rate of pre-term labour and preeclampsia (Ekbom et al, 2001; Khoury et al, 2002). More than half of the present study group were screened for renal and retinal problems prior to pregnancy, but there is still room for improvement. Appropriate advice should be offered if individuals have progressive conditions that will further deteriorate in pregnancy.

Several classes of medications are used for glycaemic control in type 2 diabetes, including insulin, sulphonylureas and biguanides. Women with type 2 diabetes can now be advised to use metformin as an adjunct or alternative to insulin in the pre-conception period and during pregnancy, when the likely benefits from improved glycaemic control outweigh the potential for harm. All other oral hypoglycaemic agents should be discontinued before pregnancy and insulin substituted (NICE, 2008). More

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1. Prepregnancy counselling encompasses optimising glycaemic control, contraception selection, management of diabetes complications and evaluation of the psychosocial aspects of pregnancy, childbearing and diabetes care (Kendrick, 2004).
2. The authors believe that there should be dedicated pre-conception clinics with multidisciplinary input running alongside other diabetes services both in primary and secondary care, and that education sessions with multidisciplinary input should be driven towards these women at all annual visits in both primary and secondary care.
3. Attendance at preconception clinics is very useful for women with diabetes who are planning to become pregnant, therefore information on such clinics should be provided when possible.

than half of the present study population continued metformin into their pregnancy, while the rest were changed to other options. Advice was equally offered by GPs, community midwives and DSNs, though they were not seen in dedicated pre-conception clinics.

Prepregnancy counselling encompasses optimising glycaemic control, contraception selection, management of diabetes complications and evaluation of the psychosocial aspects of pregnancy, childbearing and diabetes care (Kendrick, 2004). Annual reviews should be geared to detecting women with diabetes who are planning a pregnancy, and prompt steps should be taken to maximise a positive outcome. If the risks of pregnancy outweigh the benefits, this should trigger a discussion of contraception and prepregnancy planning. There should be contingency plans to identify those women who have severe microvascular complications, such as retinopathy or nephropathy, and appropriate referrals should be organised at an early stage.

The authors believe that there should be dedicated pre-conception clinics with multidisciplinary input running alongside other diabetes services both in primary and secondary care, and that education sessions with multidisciplinary input should be driven towards these women at all annual visits in both primary and secondary care. Discussions should be focused towards their pregnancy planning, and contraceptive advice should run alongside diabetes services and antenatal sessions in the community.

Conclusion

Pregnancy complicated by pre-existing diabetes is known to have associated risks that, to some extent, can be mitigated by pregnancy planning and appropriate pre-conceptual advice. Vigorous education of healthcare professionals both in primary and secondary care is key, so that adequate advice can be given at all stages to maximise good pregnancy outcomes for mother and infant. Dedicated prepregnancy clinics may be needed to provide this care effectively and vigilantly.

There is a need to provide information and education to women with diabetes of reproductive age in general, as pregnancies are often unplanned. Attendance at pre-conception clinics is very useful for women with diabetes who are planning to become pregnant, therefore information on such clinics should be provided when possible. ■

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