Type 2 Diabetes and Pregnancy

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Abstract

The UK is experiencing a dramatic increase in prevalence of type 2 diabetes mellitus (T2DM). Consequently there is a corresponding increase in T2DM in pregnancy, with 27% of pregnant women with pre-existing diabetes having T2DM. Although the risks to mother and baby are similar to type 1 diabetes mellitus (T1DM), the approach and management often differ. Pregnant women with T2DM are more likely to be older, multiparous and live in deprived areas. Certain ethic groups are more prone to T2DM and there is a strong association with being overweight and obesity. Furthermore, some surveys have shown that women with T2DM often receive suboptimum care prior to conception and in early pregnancy, particularly in primary care. This paper presents an overview of the multidisciplinary management of T2DM in pregnancy and identifies areas where care may be improved for these women.

Prevalence of type 2 diabetes in pregnancy

The occurrence of type two diabetes mellitus (T2DM) in pregnancy is a relatively new phenomenon. In previous generations women of childbearing age were considered low risk because until recently, T2DM was a condition related the older people in the general population (Diabetes UK, 2011). However, this situation has changed significantly with increasing numbers of younger people diagnosed with T2DM, including an estimated 1.5% of children with diabetes now thought to have T2DM whereas prior to 2002 T2DM was unknown in children (Diabetes UK, 2012). Recent reports have highlighted the growing prevalence of T2DM in pregnancy. The CEMACH report, (2007) found that 27% of pregnant women with pre-existing diabetes had T2DM. This rise reflects the increasing prevalence of obesity in pregnancy as increased adipose tissue is associated with increased insulin resistance (Diabetes UK, 2011). Heslehurst *et al* (2010) found that first trimester obesity had

more than doubled, increasing from 7.6% to 15.6% within 19 years. Likewise, a study in Liverpool found that 17% of women booking in for antenatal care were obese (BMI ≥ 30 kg/m^2) (Abayomi et al, 2009).

Type 2 diabetes and the importance of pre-conceptual care

Women with pre-existing T2DM require advice and support either from the primary health care team or referral to a dedicated diabetes multidisciplinary team (MDT) when planning a pregnancy. Good glycaemic control at the time of conception and in early pregnancy is crucial in reducing the risk of diabetes related complications (NICE, 2008). Despite this the CEMACH report found that only one third of women with T2DM had accessed pre-conceptual care.

CEMACH (2007) also found that less than a fifth (17%) of maternity clinics offered a structured, maternity multidisciplinary service. According to the medical records reviewed within the report, less than half of women were taking folic acid supplements, with a minority taking the correct dose of one 5 milligram tablet per day. Folic acid supplementation was lower for women with T2DM (29% compared to 43% T1DM). Moreover, less than half of women had been advised about glycaemic control, contraception, complications, diet and alcohol prior to pregnancy. Two thirds of women (79%) had suboptimal glycaemic control prior to conception and only 54% had HbA1c recorded in the 12 months prior to pregnancy.

A number of recommendations were made to improve pre-conception care, in particular, ensuring that all women with diabetes have access to all members of the specialist MDT. As a minimum this should include an obstetrician, a diabetes physician, a diabetes specialist nurse, diabetes specialist midwife and dietitian (CEMACH, 2007; Department of Health (DH), 2001). In 2012, Diabetes UK published a list of ‘15 essentials’ regarding diabetes care. One of these essentials (13) is access to specialist care when pregnant or planning pregnancy (Diabetes UK, 2012).

Primary Care

Women should be advised by the primary health care team to access pre-conceptual care with their diabetes specialist nurse to achieve an HbA1c of 6.1% or lower before conception (NICE 2008). Moreover, individual health advice should be aimed at planning a pregnancy when the optimal blood glucose levels and other health related goals have been achieved. Pre-conceptually advice should ideally be discussed at every opportunity with the primary health care team (Table 1).

Table 1: Pre-conceptual Care

Monthly HbA1c monitoring
Blood glucose <5.6 millimole/litre before meals or < 7.8 millimole/litre 2 hours after eating
Discuss the importance of a healthy balanced diet
Avoid alcohol whilst trying to get pregnant and during pregnancy
Stop smoking by referral to smoking cessation services
Avoid illicit/recreational drug use by referral to the appropriate support services
Start Folic Acid supplementation of 5 milligrams/day (higher than the recommended dose for the general population) before conception and up to 12 weeks gestation
Check blood pressure
Review existing medication as some commonly used in T2DM are contraindicated in pregnancy (e.g.) angiotensin-converting enzyme (ACE) inhibitors or angiotensin-11 receptor antagonists and statins. Oral hypoglycaemic agents (OHA) other than Metformin, e.g. Glibenclamide will need to be replaced with either Metformin or insulin
Review weight management/reduction plan
Determine rubella status

(Diabetes UK, 2006; Diabetes UK 2011; NICE 2008).

Ideally, women with T2DM should be referred to see the MDT to discuss pregnancy information and a realistic plan made about when to advice women to stop using contraception. Women with an HbA1c above 10% should be strongly advised to avoid pregnancy (NICE 2008).

Complications of diabetes during pregnancy

Pregnancies complicated by diabetes are considered 'high risk' pregnancies (Table 2). Pregnant women aged over 35 years and those with pre-existing medical conditions including hypertension and T2DM have greater risk of cardiovascular disease therefore monitoring with electrocardiograph (ECG) is recommended (CEMACH (2007). Furthermore, as women with T2DM have increased risk of hypertensive disorders in pregnancy and low dose aspirin is known to protect individuals with diabetes against hypertension (Diabetes UK, 2009), one 75 milligram tablet of aspirin is recommended daily from 12 weeks gestation until the birth of the baby.

Table 2. Complications of pregnancy associated with different types of diabetes

Complication	Type of DM
Maternal Ketoacidosis and hypoglycaemia	Type 1&2
Miscarriage	Type 1&2
Genetic malformation	Type 1&2
Still birth/Fetal death	Type 1&2, GDM
Polyhydramnios	Type 1&2, GDM
Pre-eclampsia	Type 1&2
Macrosomia/Large for gestational age	Type 1&2, GDM
Shoulder dystocia/Birth trauma	Type 1&2, GDM
Neonatal hypoglycaemia	Type 1&2, GDM
Induction of labour or caesarean section	Type 1&2, GDM
Transient neonatal morbidity	Type 1&2, GDM
Obesity and/or diabetes developing later in the baby's life	Type 2, GDM

(NICE, 2008).

CEMACH (2007) found that pregnancy outcomes were equally poor in women with T2DM as those with type T1DM, and poor glycaemic control based on $HbA1^C$ results in early pregnancy was the most significant risk factor for both congenital malformations and stillbirth.

Pregnant women with T2DM are more likely to be older, multiparous and live in deprived areas. They are more likely to be obese (BMI ≥ 30 kg/m^2), with 62% of those with T2DM being classed as obese compared to 15% with T1DM (p<0.001) (CEMACH, 2005) and are more at risk of hypertension during pregnancy (Diabetes UK, 2008). Certain ethnic groups are also more likely to develop T2DM, particularly people of African, black Caribbean, South Asian, Middle Eastern and Chinese family origin (NICE, 2008). Therefore, women and families may have socio-economic and cultural influences in addition to diabetes and pregnancy to contend with.

Achieving good glycaemic control

NICE (2008) provides detailed information regarding specific care for pregnant women with diabetes, highlighting assessments and information that should be provided at each appointment to ensure optimal glycaemic control is achieved. To summarise, women with T2DM will require individualised advice regarding blood glucose targets and monitoring. Moreover, additional education regarding insulin management may be needed, as many will

be commencing insulin for the first time and insulin doses change throughout pregnancy (Rayburn et al 1985). Women taking insulin will require detailed advice regarding preventing and managing hypoglycaemia, plus detecting and managing ketoacidosis. Both conditions can be more prevalent in pregnancy and can occur with less warning because of metabolic changes in pregnancy (Rayburn et al 1986).

Access to a specialist dietitian is essential to help women achieve the optimum healthy diet for diabetes in pregnancy, especially if new to insulin treatment. Women will require education to identify sources of dietary carbohydrate, amount of carbohydrate and an awareness of glycaemic index. Pregnant women also require advice regarding food hygiene and foods contraindicated in pregnancy as part of their routine antenatal care (see NHS 2011a; NHS 2011b for details). Specialist dietetic advice can also help if women have additional challenges such as overweight/obesity; hypoglycaemia or severe nausea/vomiting during pregnancy. All women with T2DM can benefit from a dietetic review particularly if they haven't seen a dietitian before or for some time and their T2DM dietary information is outdated.

Antenatal Care

Diabetes is the most frequent medical disorder that affects the outcome of pregnancy. NICE (2008) provides very detailed guidance regarding antenatal care for women with diabetes highlighting assessments and information that should be provided at each antenatal appointment (Table 3). Women with T2DM will require individualised advice regarding blood glucose monitoring and alterations to both diet and medication in order to achieve optimal targets throughout pregnancy. The aim of the MDT during pregnancy is to optimise pregnancy outcome for women with pre-existing diabetes. Therefore, the importance of the health-care relationships for pregnant women with T2DM is crucial and this relationship must be open and trusting with the MDT. The aim of antenatal care is not only to provide a medically orientated pathway to optimise pregnancy outcomes but also to provide supportive midwifery care to assist women with pregnancies complicated with diabetes to achieve the best possible emotional health and wellbeing during pregnancy and the transition to motherhood.

Antenatal care should be accessed as soon as pregnancy is confirmed as poor pregnancy outcome is more prevalent with T2DM. Therefore additional monitoring and screening of fetal development is essential, including routine care as well as the specialist involvement of the midwife as part of the MDT. Ultrasound scans are used to monitor fetal growth, fetal wellbeing (uteroplacental and umbilical artery doppler) and amniotic fluid volume (NICE,

2008). CEMACH (2007) found that nearly half of babies with macrosomia did not receive adequate fetal surveillance; this was associated with fetal and neonatal death. Moreover, due to an increased risk of stillbirth, tests for fetal wellbeing in T2DM, such as cardiotocographic (CTG) monitoring can be used after 28 weeks gestation when necessary (polyhydramnios, accelerated growth or risk of intrauterine growth restriction (IUGR)) and all women need detailed advice regarding monitoring of fetal movements (Royal College of Obstetricians and Gynaecologists (RCOG), 2011).

Table 3: Antenatal Care Pathway

1st Antenatal booking visit (as soon as pregnancy confirmed)	Medical review with diabetes physician and obstetrician Retinal screening in previous 12 months Renal assessment with MSSU/proteinuria Review/stop/alter medication Routine booking bloods for pregnancy to include: U/E's, TFT's, HbA1c, ACR
7–9 weeks gestation	Ultrasound scan for dating
Pre-conceptually or as soon as pregnancy confirmed and until > 12 weeks gestation	5 mg Folic Acid
From 12 weeks gestation and throughout pregnancy	75 mg Aspirin (unless contraindicated)
Antenatal visits weekly or fortnightly depending on glycaemic control	Set individual targets for self-monitoring Test fasting (before breakfast), pre-breakfast, pre-lunch, pre-tea & bedtime. Fasting < 5mmol/l; Pre-meal 3.5 – 5.9 mmol/l; Post-prandial < 7.8 mmol/l; Bedtime 3.5 – 5.9 mmol/l HbA_{1c} 4 weekly
Pregnancy Ultrasound 10–13 weeks	Combined test for Down's screening
20 weeks	Fetal anatomy (to include cardiac 4-chamber view and outflow tracts)
30 & 34 weeks	Growth scans & dopplers Scans planned individually if there is a risk of intra uterine growth restriction due to maternal comorbidity
34 weeks	Decision about mode of delivery and timing of birth after 34 week scan or before if indicated. Plan for induction of labour/caesarean section at 38 weeks
Midwifery advice	Women are advised if treated with oral hypoglycaemic agents (OHA) before pregnancy to resume pre-pregnancy dose after delivery. Only Metformin and Glibenclamide are recommended during breastfeeding. Other OHA/medication discontinued during pregnancy should be avoided while breastfeeding

(NICE 2008)

In 2013 Diabetes UK published 'The State of the Nation' report and although there were no specific data relating to pregnancy, it highlighted inconsistencies regarding quality of care. Only 4.2% of people with diabetes were offered structured education with people living in the best performing Clinical Commissioning Group areas four times more likely to be given eight of the essential health checks recommended by NICE, compared to people living in the

worst performing area (Diabetes UK 2013). This highlights the need for urgent improvements in diabetes care.

Conclusion

T2DM is becoming more prevalent in pregnancy as the number of women who are overweight or obese has increased in the general population. T2DM is now predominantly more common in younger women of childbearing age. The risks to mother and baby are similar to T1DM, yet T2DM is often considered less serious, sometimes being managed in primary rather than specialist maternity care. As a result, women with T2DM often receive suboptimal pre-conception care and early antenatal care. Women with T2DM are more likely to have additional complications such as obesity, cardiovascular risks, increasing age and hypertension, therefore specialist care from all members of the multidisciplinary team is essential. Moreover, specialist care prior to conception, during pregnancy and in the postpartum period not only helps to reduce complications of diabetes in pregnancy but may also encourage women to make changes to their diet and lifestyle and ultimately improve health in the long term.

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