

Colostrum harvesting and type I diabetes

Tracey Clay

Introduction

This article is an example of a collaborative partnership approach between a multidisciplinary team in a joint antenatal diabetes clinic and a mother with type I diabetes. The whole team supported this woman from pre-conception, throughout her second pregnancy and postnatally to help her experience the harvesting of colostrum in the antenatal period and enable a positive breast-feeding outcome for her newborn daughter. This experience has harnessed the working practices of the specialist team, including the midwife, diabetes specialist nurse and breast-feeding coordinator, where the sharing of knowledge and practice has enabled appreciation of professional roles.

Diabetes is the most common pre-existing medical disorder complicating pregnancy in the United Kingdom, with approximately one pregnant woman in 250 having pre-existing diabetes (Department of Health [DoH], 2001). Breast-feeding and type I diabetes is a particular challenge for a woman in her childbearing years. Maintaining optimal diabetes control while learning a new skill may fill these women's lives with trepidation. However, with good support and advice, breast-feeding can be an enjoyable, achievable and sustained experience.

The structure of the joint antenatal diabetes (JAND) clinic in the author's hospital is well in-line with the recommendations set out in both the National Service Framework for diabetes (DoH, 2001) and Scottish Intercollegiate Guidelines Network (Scottish Intercollegiate Guidelines Network, 1991) for antenatal care of women with diabetes. Held on a weekly basis (with the exception of Bank Holidays), a multidisciplinary group of professionals gather for a combined clinic offering both pre-conceptual and antenatal care.

The JAND team at Scunthorpe General Hospital consists of an obstetrician, diabetologist, diabetes specialist nurse (DSN) leading in pregnancy, a midwife and a dietitian with

interests in pregnancy and diabetes. The team prides itself on achieving positive experiences for pregnant women with diabetes and working towards achieving a satisfying breast-feeding outcome. All mothers have the opportunity to have an individual discussion with an appropriately-trained health professional regarding the benefits of breast-feeding; these recommendations, which are underpinned by the DoH (DoH, 2002), are based on the World Health Organization (WHO) Systematic Review (Department of Health and Nutrition for Health and Development et al, 2002) advocating exclusive breast-feeding for the first six months of an infant's life.

Case history

The woman, who is para two, gravida one, was diagnosed in her first pregnancy as having type I diabetes mellitus with an inherited condition Factor 5 Leiden defect. The woman, Sarah, has agreed for names and photographs to be published. Sarah commenced insulin and managed her diabetes control throughout her first pregnancy. She was successfully delivered of a baby girl by emergency caesarean section following failure to progress in labour at 39 plus five weeks. Sarah breast-fed her daughter for five months. Some 18 months later, Sarah actively sought advice from the DSN team

ARTICLE POINTS

- 1 Joint antenatal care can work effectively.
- 2 Support and advice can lead to successful colostrum harvesting and breast-feeding.
- 3 Colostrum harvesting will assist in maintaining exclusive breast-feeding and should be encouraged for benefit of mother and child.
- 4 The author believes further research into colostrum composition and its possible effects on blood glucose control in women with diabetes is warranted.

KEY WORDS

- Pregnancy
- Preconceptual advice
- Breast-feeding
- Glycaemic control
- Colostrum

Tracey Clay is a Diabetes Specialist Nurse at the Diabetes Centre, Scunthorpe General Hospital, Scunthorpe, North Lincolnshire

Figure 1. The author gave Sarah preconceptual advice on how to adequately control her diabetes through the pregnancy. They met again for discussion on the day of her caesarean section (see picture).



expressing her wishes to conceive. An appointment was made for the following week to be seen in the JAND clinic for preconceptual advice (see *Figure 1*).

Preconception

Sarah had exemplary diabetes control, achieving an HbA_{1c} of 6.4% on each occasion that it had been measured. The reasons for maintaining her HbA_{1c} in the non-diabetic range for at least three months prior to pregnancy in relation to organogenesis were explained to Sarah, and have been well documented in the literature (Furhrmann et al, 1983; Casson et al, 1997; Suhonen et al, 2004; DoH, 2001). It was agreed that Sarah's HbA_{1c} was to be re-checked in one month and if it remained at less than 7% she would commence the recommended dose of 5 mg folic acid for women with diabetes (Diabetes UK, 2002; DoH, 2001). A discussion took place on the appropriate regimen and it was decided that she would remain on multiple injection therapy of soluble insulin (Actrapid) and isophane insulin (Insulatard).

Historically, Actrapid was the insulin of choice for preconception and/or pregnancy, but more recently, this has been changed to the short-acting analogue insulin aspart (NovoRapid). Long-acting analogues (e.g. insulin glargine [Lantus] and insulin detemir [Levemir])

are not recommended for use in pregnancy (Diabetes UK, 2004).

Injection sites were checked, blood glucose monitoring equipment was checked for accuracy and a discussion took place on increased risks of hypoglycaemia (Diabetes Control and Complications Trial [DCCT] Group, 1993) and prevention and treatment. In-line with National Service Framework guidelines (DoH, 2001) for pregnancy, Sarah's blood glucose targets were 4–7 mmol/l pre-prandially and no greater than 10 mmol/l post-prandially. Recommendations for the supply and use of glucagon are provided by Diabetes UK (2002); Sarah was supplied with the same and given a demonstration on its use. For the checklist of other aspects addressed, see *Table 1*. Three months later, Sarah telephoned to say she was pregnant.

Antenatal management

At the first antenatal appointment Sarah was six weeks pregnant and was seen by all health professionals in the multidisciplinary team. This consultation recapped and covered aspects to encourage self-management to aid and optimise diabetes control, for example appropriate dose adjusting, sick day rules, and advice for hyperemesis and illness (see *Table 1*). It was during one of the initial visits to the JAND clinic that Sarah expressed her wishes to breast-feed again.

PAGE POINTS

1 Sarah had exemplary diabetes control, achieving an HbA_{1c} of 6.4% on each occasion that it had been measured.

2 The reasons for maintaining her HbA_{1c} in the non-diabetic range for at least three months prior to pregnancy in relation to organogenesis were explained to Sarah.

3 Recommendations for the supply and use of glucagon are provided by Diabetes UK; Sarah was supplied with the same and given a demonstration on its use.

Table 1. An example DSN checklist for joint antenatal diabetes clinics

Name	Date	Date	Date	Date	Date	Date
Pre-pregnancy insulin and doses						
HbA _{1c}						
Blood pressure						
Retinal screening						
Home blood glucose monitoring: frequency and technique						
Blood glucose/HbA _{1c} targets						
Injection technique						
Change to insulin pen?						
Injection sites checked?						
Needle length appropriate?						
Insulin action (action profile in relation to injection timing to food)						
Insulin regimen (appropriate?)						
Insulin storage						
Sharps disposal						
Dose adjustment						
Sick day rules						
Ketones and testing						
How to recognise and treat hypoglycaemia						
Supply Hypostop						
Supply/teach glucagon						
Folic acid						
Diary supplied?						
Pregnancy/diabetes booklet supplied?						
Breast-feeding						

Early plans for colostrum harvesting and breast-feeding

Sarah wanted this baby not to have any formula milk if possible. She also wanted skin-to-skin contact, something that had been unavoidably denied at the first delivery. The DSN contacted the breast-feeding coordinator and a series of joint meetings were held throughout the pregnancy with Sarah and both health professionals in attendance, this being the ethos of the multidisciplinary working within the JAND clinic.

The Trust policy states that: ‘All mothers have the right to make a fully informed choice as to how they feed their babies.’ However, it is believed that this is

the first time that the Trust had been faced with the situation of a woman who wished to exclusively breast-feed and collect her own colostrum. The breast-feeding coordinator, therefore, played a significant role.

The idea of harvesting colostrum from 36 weeks into the pregnancy, which is something that is successfully managed at Chesterfield and North Derbyshire Royal Hospital Trust, also transpired from these meetings. A literature search showed that very little has been written about the effectiveness of colostrum harvesting and the effects on the management of diabetes. Nonetheless Sarah was very keen to try it with the hope of maintaining

PAGE POINTS

1 At 36 weeks, Sarah was encouraged to hand-express colostrum at least three times per day.

2 One of the findings incidental to the harvesting of colostrum was the lowering of blood glucose readings before mealtimes, and Sarah actively tested on numerous occasions per day, adjusting her insulin doses to maintain normoglycaemia.

exclusivity in breast-feeding and was directly supported through the whole process.

Colostrum harvesting

Colostrum, the first yellow-coloured, viscous mammary secretion that women produce from around the sixteenth week of pregnancy, is thought to be an unbeatable food for the newborn baby. It has high levels of Immunoglobulins A (IgA) and M (IgM), which confer local gastrointestinal immunity to the newborn child (Miranda et al, 1983).

Using UNICEF guidelines (UNICEF, 2001) and hospital policy, measures were initiated to enable harvesting. The consultant paediatrician was involved with the decision making for the baby, and a feeding plan (see Table 2) was circulated to the DSN, team midwives, obstetrician, and diabetologist. Sarah was provided with a range of literature (from sources including La Leche League International, UNICEF and the NHS) to ensure this continued to be an informed and involved decision process.

At 36 weeks, Sarah was encouraged to hand-express colostrum at least three times per day. Volumes of colostrum were not measured initially and were frozen in bottles provided by the hospital. This was deemed to be a costly venture as there is a 'non-reusable policy' for such items and Sarah inevitably purchased some milk bags. The milk bags, although marketed for breast milk, were not recommended under the Northern Lincolnshire and Goole Hospitals NHS Trust breast-feeding policy due to handling difficulties and potential leakage. However, Sarah experienced no such

problems.

One of the findings incidental to the harvesting of colostrum was the lowering of blood glucose readings before meal times, and Sarah actively tested on numerous occasions per day, adjusting her insulin doses to maintain normoglycaemia.

Breast-feeding benefits

It is widely accepted that exclusive breast-feeding for the first six months of life provides the greatest benefit to baby and mother, with early contact immediately post-delivery having a beneficial effect on the prevention of infection and immunisation (Karjalainen et al, 1992; Kiln et al, 1994; Department of Health and Nutrition for Health and Development et al, 2002). Breast-feeding promotes the mobilisation of alternative sources of fuel in the newborn (WHO, cited in Oscroft, 2001) and formula milk stimulates an increased production of insulin, which may indirectly lead to hypoglycaemia. Equally important is an independent protective factor against the development of type 1 diabetes in childhood (Sadauskaite-Kuehne et al, 2004) and yet, interestingly, a very high proportion of breast-fed babies (28% in 2000) receive formula or water while they are still in hospital (Hamlyn et al, 2002).

Screening for mother and baby

Sarah attended all JAND clinic appointments and had all DoH-recommended foetal surveillance (DoH, 2001) with anomaly and biophysical scans at 20 and 27 weeks, and a final scan at 36 weeks with an estimated foetal weight of 6 lbs 9 oz (2982 grammes), cephalic presentation with 'normal' liquor levels present. Retinal screening was performed each trimester with nil to note and she remained normotensive with optimised glycaemic control (see Figure 2).

Maternal and foetal complications

There is an increased risk of complications during pregnancy and dietetic advice is the cornerstone to all

Table 2. The feeding plan circulated to other members of the multidisciplinary team

- Birth plan to be completed at 34 weeks
- Skin-to-skin contact immediately post-delivery
- Initiate colostrum feeding within one hour of birth
- Newborn should not be bathed until 48 hours post-delivery
- Newborn should not be given a teat or dummy
- Newborn to be fed upon demand

diabetes control. The JAND dietitian gave Sarah advice to cease drinking any alcohol, highlighting the increased risk of spontaneous abortion in first trimester if more than three units of alcohol are consumed per week (Royal College of Obstetricians and Gynaecologists, 1999). She was given the advice of following an omega-3-rich diet, which plays an integral role in cell membrane metabolism and the development of the brain and eyes within the foetus (Food Standards Agency, 2004; Ruxton, 2004), and was dissuaded from consuming unpasteurised milk, pre-cooked or uncooked food, which can lead to still-birth or miscarriage (DoH, 1996).

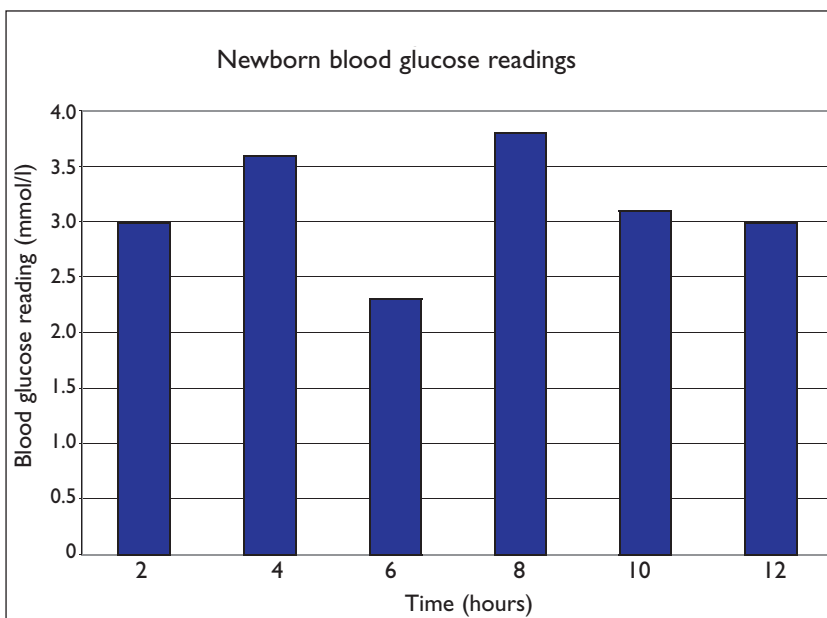
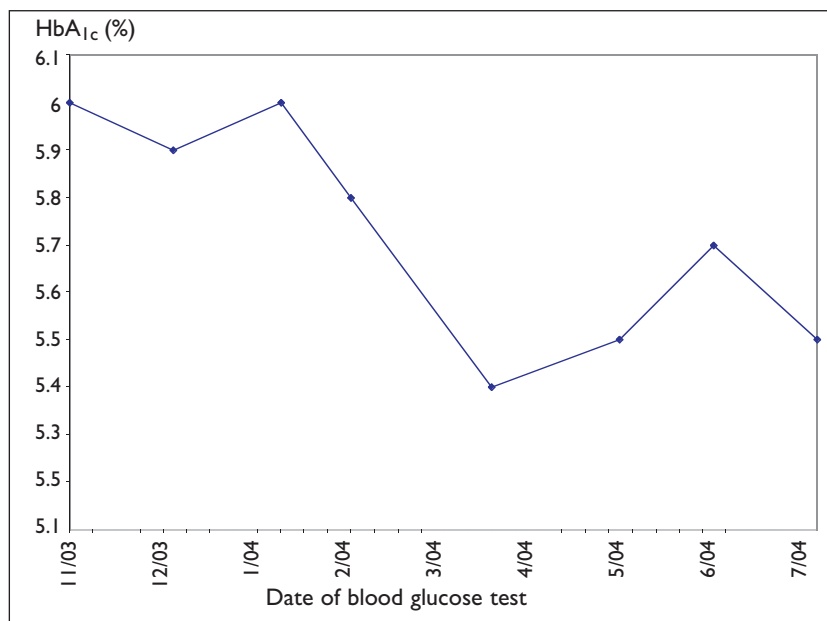
While these issues are pertinent to women who have diabetes, they are also relevant to those who do not have diabetes. Sarah is an ex-smoker; according to Montgomery and Ekblom (2002), this does not increase the foetal risk of diabetes later in life nor the odds for limb deficiency (Czeizel et al, 1994).

Newborn hypoglycaemia

Perinatal hypoglycaemia is associated with transient hyperinsulinaemia and is commonly seen in the babies of mothers with diabetes (Williams, 1997), potentially affecting the ability to suckle and therefore warranting the need to cup feed. Harvesting the colostrum in the antenatal period enables quantities of colostrum to be used as a first line in the prevention of such episodes of hypoglycaemia.

Conclusion

Sarah's outcome was a very positive in several ways. By enabling her through discussion and support to discuss an action plan for her breast-feeding ideas, she very ably collected a three week supply of colostrum that was frozen and carried to hospital on the day of the planned caesarean section. She delivered Eden, a healthy girl who weighed 8lbs 4 oz (3740 grammes) and had the skin-to-skin contact immediately after delivery – the one thing she longed for with her first pregnancy. Eden was cup-fed colostrum one hour post-delivery, was normoglycaemic (see



Figures 3 and 4) and did not receive formula feed.

Sarah was discharged home at her request two days post-caesarean section and lactogenesis occurred three days post-delivery. There were no reported problems with Eden, Sarah, breast-feeding or the wound site. To date, Sarah is still breast-feeding and has the satisfaction of knowing her baby has been exclusively breast-fed. Incidental findings were the lowering of blood glucose readings after expressing and before the next mealtime. The author would question a reduction in blood glucose reading being purely incidental as this may occur due to warm weather,

Figure 2 (top). Sarah's HbA_{1c} level as recorded at clinic appointments during her pregnancy.

Figure 3 (bottom). Baby Eden's blood glucose levels during the first 12 hours after birth.

carbohydrate intake, levels of activity and placental hormones being reduced in the last few weeks of pregnancy. The author believes further research into colostrum composition and effects on blood glucose readings in women with diabetes is warranted.

The hospital breast-feeding policy is to be reviewed. To compliment this, the relationships within the JAND team were greatly enhanced and another arm to the team flourished as we grew and learned together about one another's areas of expertise – something quite powerful that can only benefit pregnant women with diabetes. ■



Figure 4. Sarah and baby Eden shortly after the delivery.

- Casson IF, Clarke CA, Howard CV, McKendrick O, Pencook S, Pharoah POD et al (1997) Outcomes in pregnancy in insulin dependant diabetic women: results of a five-year population cohort study. *British Medical Journal* **315**: 275–85
- Czeizel AE, Kodaj I, Lenz W (1994) Smoking during pregnancy and congenital limb deficiency. *British Medical Journal* **308**: 1473–76
- Department of Health (2002) *National Service Framework for Diabetes: Delivery Strategy*. Department of Health, London
- Department of Health (2001) *National Service Framework for Diabetes: Standards*. Department of Health, London
- Department of Health (1996) *While you are pregnant: Safe eating and how to avoid infection from food and animals*. Department of Health, London
- Department of Nutrition for Health and Development, Department of Child and Adolescent Health and Development. MS Kramer R, Kakuma (2002) *Optimal Duration Of Exclusive Breast-feeding a Systematic Review*. World Health Organization, Geneva
- Diabetes Control and Complications Research Trial Group (1993) The effect of intensive treatment of diabetes on the development and progression of long term complications in insulin-dependent diabetes mellitus. *New England Journal of Medicine* **329**: 977–86
- Diabetes UK (2002) *Preconception care for women with diabetes*. London, Diabetes UK. Available at <http://www.diabetes.org.uk/infocentre/carerec/preconcept.htm> (accessed 02.03.05)
- Diabetes UK (2004) *Care recommendations: Recommendations for the management of pregnant women with diabetes (including gestational diabetes)*. London, Diabetes UK
- Food Standards Agency (2004) *Your guide to oily fish*. London, Food Standards Agency. Available at <http://www.food.gov.uk/news/newsarchive/2004/jun/fishportionslifetagechart> (accessed 04.03.05)
- Furhrmann K, Reiher H, Semmier K, Fischer F, Fischer M, Glockner (1983) Prevention of congenital abnormalities in infants of insulin-dependant diabetic mothers. *Diabetes Care* **6**: 219–23
- Hamlyn B, Brooker S, Oleinikova K, Wands S (2002) *Infant Feeding*. The Stationary Office, London
- Karjalainen J, Martin J, Knip M et al (1992) A bovine albumin peptide as a possible trigger of insulin-dependent diabetes mellitus. *New England Journal of Medicine* **327**: 302–07
- Kiln, MR, Henschel D, Kiln L (1994) Breast-feeding and diabetes mellitus. *British Medical Journal* **308**: 534–35
- Miranda R, Saravia NG, Akerman R, Murphy N, Berman S McMurray DN (1983) Effects of maternal nutritional status on immunological substances in human colostrum and milk. *American Journal of Clinical Nutrition* **37**: 632–40
- Montgomery SM, Ekblom A (2002) Smoking during pregnancy and diabetes mellitus in a British longitudinal birth cohort. *British Medical Journal* **324**: 26–27
- Oscroft R (2001) Antenatal expression of colostrum. *Practical Midwife* **4**: 32–39
- Royal College of Obstetricians and Gynaecologists (1999) *Alcohol Consumption in Pregnancy*. Royal College of Obstetricians and Gynaecologists, London
- Ruxton C (2004) Health benefits of omega-3 fatty acids. *Nursing Standard* **18**(48): 38–42
- Sadauskaite-Kuehne V, Ludvigsson J, Padaiga Z, Jasinskiene E, Samuelsson V (2004) *Diabetes Metabolism Research and Review* **20**: 150–57
- Scottish Intercollegiate Guidelines Network (2001) *SIGN Guideline 55. Management of Diabetes. A national clinical guideline*. SIGN
- Suhonen L, Hiilesmaa V, Teramo K (2004) Glycaemic control during early pregnancy and fetal abnormalities in women with Type 1 diabetes mellitus *Diabetologia* **43**: 79–82
- UNICEF (2001) *Implementing the Baby Friendly Best Practice Standards*. UNICEF
- Williams, A. (1997). *Hypoglycaemia of the Newborn: Review of the Literature*. World Health Organization, Geneva