Dietary management of obesity and diabetes in pregnancy: Challenging the current guidelines

Julie Abayomi, Margaret Charnley

The prevalence of type 2 diabetes (T2D) and gestational diabetes (GD) in pregnancy is increasing and is often linked to obesity. Additionally, more obese women are attending antenatal clinic. Current guidance states that women with a BMI >30 kg/m^2 should limit weight gain in pregnancy to 5–9 kg, but there are no recommendations for weight maintenance or weight loss. It is known that poor diets, low in energy, may result in poor pregnancy outcome. However, overweight women with T2D or GD often indirectly reduce their calorie intake by following a healthier diet in pregnancy. A low sugar diet alongside a healthy nutrient intake may be a safe way to prevent weight gain or encourage sensible weight loss in pregnancy, which may reduce complications and promote significant weight loss in the long term.

Article points

1. The authors question the lack of guidance for obese women to maintain or lose weight during pregnancy.
2. Overweight women often change their diet during pregnancy as they are more conscious of eating healthily for the sake of their child.
3. Nutritional education for overweight women with diabetes or gestational diabetes could be an important way of encouraging long-term weight loss.

Key words

- Gestational diabetes
- Nutrition
- Obesity
- Pregnancy

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The prevalence of type 2 diabetes (T2D) in UK pregnancies is increasing. The Confidential Enquiry into Maternal and Child Health (CEMACH) found that 27% of pregnant women with pre-existing diabetes had T2D (CEMACH, 2005). Furthermore, the number of women being diagnosed with gestational diabetes (GD) is also rising, with around 87.5% of diabetes in pregnancy due to GD (CEMACH, 2005). Women who are diagnosed with GD have a 30% risk of developing T2D during their lifetime, compared with a 10% risk in the general population (Diabetes UK, 2011a)

There are a number of factors that can increase the risk of T2D and GD in pregnancy, predominantly overweight and obesity (Diabetes UK, 2011a). CEMACH (2005) found that women with T2D were more likely to be older; multiparous; black, Asian or other ethnic minority group; living in socially deprived areas and/or overweight. Risk factors for GD are shown in *Table 1*.

Overweight and obesity in pregnancy

CEMACH (2005) found that pregnant women with T2D were more likely to be obese (BMI >30 kg/m^2), with 62% of those with T2D and 15% with type 1 diabetes (T1D) being obese (P<0.001). Obesity is not only a risk factor for T2D and GD, but other serious complications of pregnancy such as hypertensive disorders, caesarean section, and anaesthetic and postoperative complications

(Galtier-Dereure et al, 2000). A study in Liverpool found that despite better glycaemic control, pregnant women with T2D were far more likely to require an emergency caesarean section than women with T1D: 44% compared with 14% (P>0.05) (Spelman et al, 2007).

Moreover, CEMACH (2007) found that in 2003–2005, 52% of pregnant women who died had a BMI >25 kg/m^2 and 15% were morbidly obese with a BMI >35 kg/m^2. Thromboembolism, a complication of obesity, was the principal cause of death (CEMACH, 2007).

Overweight and obesity are increasing dramatically in pregnancy. Heslehurst et al (2010) found that first trimester obesity has more than doubled, increasing from 7.6% to 15.6% in a 19-year period. Furthermore, a study in Liverpool found that 27% of women booking in for antenatal care were overweight (BMI 25–29.9 kg/m^2) and 17% were obese (BMI >30 kg/m^2) (Abayomi et al, 2009).

Extreme or morbid obesity in pregnancy is also becoming increasingly common. In the UK, one in every 1000 women who gives birth has extreme obesity, i.e. a BMI >49.9 kg/m^2 (NICE, 2010). In the Liverpool study, 113 pregnant women had a BMI >39.9 kg/m^2; the largest BMI was 65.7 kg/m^2 (Abayomi et al, 2009).

Table 1. Risk factors for gestational diabetes (Diabetes UK, 2011a).

- Obesity.
- A family history of type 2 diabetes (parent, brother or sister).
- An unexplained stillbirth or neonatal death in a previous pregnancy.
- A very large infant in a previous pregnancy (≥4.5 kg).
- Previous gestational diabetes.
- South Asian, African-Caribbean or Middle Eastern ethnicity.

Despite this, recommendations for weight management in pregnancy are rather vague. NICE (2010) recommends:

- Achieving a healthy weight before conception.
- Avoid dieting while pregnant.

There are no UK guidelines for healthy weight gain in pregnancy but the USA's Institute of Medicine (2009) recommends that pregnant women with a BMI >29.9 kg/m^2 should limit weight gain to 5–9 kg.

Is it really advisable that a pregnant woman with a BMI >50 kg/m^2 should gain more weight?

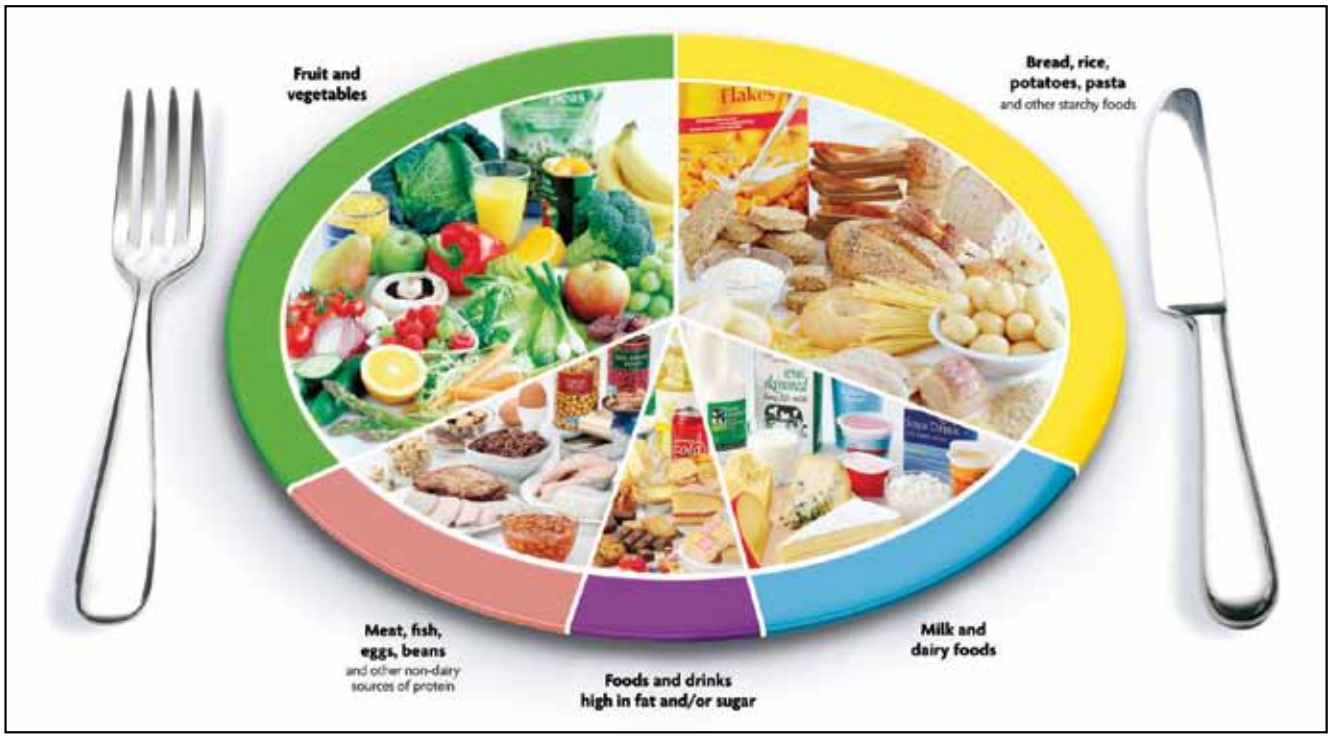

Figure 1. The eatwell plate shows how much of the diet should come from which food groups (Department of Health, 2011).

Page points

1. There is no guidance recommending weight loss in pregnancy, despite the link between obesity and the development of gestational diabetes.
2. Some studies have shown positive outcomes following weight loss or restricted weight gain in pregnancy.
3. Dietary advice in pregnancy should focus on healthy eating; this may, in turn, lead to weight loss in overweight women.

Moreover, the specific needs of women with a BMI of 30 kg/m^2 will differ considerably from those with a BMI of >50 kg/m^2, yet there is no recognition of this.

The Centre for Maternal and Child Enquiries and the Royal College of Obstetricians and Gynaecologists (CMACE/RCOG) joint guidelines (2010) recognise the link between obesity and the development of GD, recommending screening via a glucose tolerance test for all pregnant women with a BMI ≥30 kg/m^2. The guidelines also acknowledge the importance of dietary advice in managing GD and in reducing risk factors associated with adverse pregnancy outcomes. Although weight loss is encouraged pre-conceptionally and post-delivery to minimise complications, healthy eating and appropriate exercise to prevent excessive weight gain is recommended during pregnancy.

Currently no guidelines recommend weight loss or even weight maintenance during pregnancy. This is based on studies that found an increased prevalence of pregnancy complications in women who lost weight. Birdsall et al (2009) found that very restrictive diets (particularly those low in carbohydrate and high in protein) were associated with metabolic ketoacidosis and renal dysfunction.

Fejzo et al (2009) found poor pregnancy outcome following weight loss in pregnancy complicated by hyperemesis gravidarium.

The Dutch famine studies (Stein et al, 2004) found that daily energy intakes in pregnancy of 600–1500 kcal were associated with premature labour, stillbirth and neural tube defects in the first half of pregnancy; and restricted energy intake during the second half of pregnancy was associated with low birth weight.

However, all these studies refer to extreme situations where women were probably deficient in a range of nutrients, not just energy. It would be unethical and highly unlikely that anyone would recommend such severe restrictions. Conversely, these results do not indicate that all calorie restrictions in pregnancy are dangerous or that all weight loss in pregnancy is unsafe. If pregnant women maintain their nutritional requirements for macro- and micronutrients while avoiding excessive empty calories, could a safe weight loss be achieved?

Other studies have shown positive outcomes following weight loss in pregnancy. Blomberg (2011) found that women who were morbidly obese (BMI ≥40 kg/m^2) and lost weight throughout pregnancy reduced the risk of caesarean section by 24% and large for gestational age births by 11.2%, compared with women in the same BMI class who gained a modest amount of weight during pregnancy. There was a 3.7% increased risk of a small for gestational age baby compared with no increased risk in the weight gain group; however, this was only slightly above the normally observed incidences of small for gestational age babies born in Sweden.

Another Swedish study by Lindholm et al (2010), where weight gain was restricted to ≤6 kg, found that all 25 women with a BMI ≥30 kg/m^2 who completed the study delivered

Table 2. Calorie reduction in diet by reducing sugar intake.

	High sugar diet (kcal)	Low sugar alternative (kcal)	Difference
Cola	Regular cola (130)	Diet cola (<1)	–130
Sugar in tea:	Two teaspoons (36)	No sugar (or sweetener) (<1)	
Five cups of tea per day	180		–180
Biscuits	Two chocolate biscuits (167)	Two plain biscuits (155)	–12
Cornflakes	Crunchy Nut cornflakes (159)	Plain cornflakes (142)	–17
Total	856	297	–339

(Energy values taken from McCance and Widdowson, 2002)

healthy babies, within the optimal birth weight range and had normal Apgar scores. Furthermore there was a low caesarean section rate – 88% of the women had uncomplicated vaginal births. Claesson et al (2009) also reported positive birth outcomes when weight gain in obese pregnancies was limited to <7 kg, suggesting that a restricted weight gain is safe for both mother and baby.

A Danish study by Wolff et al (2008) to determine the effects of dietary counselling on gestational weight gain and glucose metabolism found that women randomised to the intervention group who limited weight gain to ≤6.6 kg had significantly reduced levels of pregnancy-induced insulin, leptin and glucose.

Do pregnant women need to eat for two?

The estimated average requirement (EAR) for energy in pregnancy is an additional 200 kcal per day in the third trimester (Committee on Medical Aspects of Food Policy, 1991). However, this is for women who are currently consuming the recommended EAR of 1900 kcal per day (for non-pregnant women). Women with a BMI >30 kg/m^2 must already be exceeding this recommendation and do not need any additional calories.

Dietary advice in pregnancy should focus on healthy eating, based on the eatwell plate in *Figure 1* (Department of Health, 2011). This ensures the regular inclusion of all essential food groups and the range of macro- and micronutrients required to sustain a healthy pregnancy. Furthermore, the consumption of regular meals prevents hunger and ketosis. The development of hunger ketosis is a possible effect of low carbohydrate, energy restricted diets (Birdsall et al, 2009).

Much of the high sugar food and drink women with T2D are asked to avoid is also high in calories. Sugary snacks such as chocolate, sweets, cakes, biscuits and fizzy drinks are often described as empty calories because they provide little useful nutrition but plenty of energy. Rugg-Gunn et al (1991) demonstrated that individuals who consumed low levels of added sugar tended to eat a more nutrient-dense diet, with high added sugar

Box 1. Case study.

The following is an actual account of a patient who managed to lose weight safely during pregnancy and maintain this weight loss long term, using a low sugar diet.

Ms S, age 27

- Weight at booking-in: 103 kg, BMI = 42.1 kg/m^2.
- Newly diagnosed gestational diabetes (GD) in January 2008, at 19 weeks' gestation.
- Her diet was as follows:
  - Breakfast – Cheerios or Crunchy Nut cornflakes with milk, coffee (no sugar).
  - Mid-morning – two slices of cheese on toast or sandwich.
  - Lunch – nothing.
  - Mid-afternoon – crisps and/or sweets (Haribo) and coffee.
  - Evening meal – corned beef hash, curry with rice, pizza or stew.
  - Before bed – fruit smoothie, popcorn or chocolate muffin.

  She ate very little fruit and vegetables.

Following her consultation with the dietitian, the following plan was agreed:

- Reduce sweets.
- Replace sugary cereal with a low sugar variety.
- Limit fruit smoothies to a small portion with meals, or have water instead.
- Replace chocolate muffins with scones or teacakes.
- Eat more fruit and vegetables.

  There was no mention of aiming to lose weight.

Outcome

Ms S made significant changes to her diet, as suggested. The dietitian did not need to utilise any motivational approaches as Ms S was already extremely motivated (as pregnant women often are), knowing that her actions would influence the health of her baby.

She included regular meals and reported that she did not feel hungry. She managed to control her GD on low sugar diet alone and did not require any medication. She was reviewed in June 2008, prior to induction of labour at 38 weeks' gestation. Her weight was now 99.4 kg; she had lost 3.6 kg in 18 weeks (a small but significant weight loss of about 0.2 kg per week). On delivery her baby was healthy and weighed 3.5 kg.

In 2010, Ms S returned to the clinic pregnant again. On this occasion she developed GD much later, at 30 weeks' gestation. Her weight at booking was 91 kg, BMI 37 kg/m^2, a considerable weight reduction of 12 kg since her previous pregnancy (>10% of previous body weight). Ms S stated that she had kept to the healthy eating plan agreed in her first pregnancy, as she did not find it difficult nor did she feel hungry. As a result she was able to maintain the weight loss for over 2 years.

Page points

1. Pregnant women with type 2 diabetes or gestational diabetes should be encouraged to eat breakfast, lunch and an evening meal, with a source of complex carbohydrate at each meal.
2. Pregnant women with a BMI >30 kg/m^2 have an increased risk of vitamin D deficiency and should have supplements prescribed daily, during pregnancy and while breastfeeding.
3. The current guidelines for the management of obesity in pregnancy are unhelpful, especially when dealing with extreme obesity.

diets associated with lower intakes of protein and vitamin D.

A low sugar diet is often a reduced calorie diet and may prevent excessive weight gain in pregnancy. *Table 2* shows how simple changes to replace high sugar items with low sugar alternatives can significantly reduce calorie intake and limit blood glucose excursions. *Box 1* demonstrates a real-life example where the desire to eat healthily in pregnancy led to significant long-term weight loss.

Dietary management of T2D and GD in pregnancy

Regular meals

Women should be encouraged to eat breakfast, lunch and an evening meal, with a source of complex carbohydrate at each meal. This helps to stabilise blood glucose and ensures a regular energy intake (Diabetes UK, 2011b).

Extra carbohydrate snacks between meals are helpful in early pregnancy, particularly if women are on insulin, because they can be more prone to hypoglycaemia during this time (Rosenn and Miodovnik, 2000). This can also help prevent nausea and vomiting which is a common problem in early pregnancy.

However, additional snacks may encourage excessive weight gain unless energy intake is redistributed from meals, so it should be explained to women that they should eat smaller meals to accommodate the energy intake from snacks.

Reduce intake of high sugar food and drink

Women should be given a list of high sugar food and drink to avoid, alongside a list of suitable low sugar alternatives. An explanation of glycaemic index helps women to include the occasional sweet treat as part of a high fibre main meal. The frequency of sweet treats would need to be negotiated for individuals, but ideally overweight women should limit treats to special occasions only.

Ensure adequate nutrients for pregnancy

Healthy eating advice is based on the eatwell plate in *Figure 1*. A regular intake of foods from the meat and alternatives group ensures an adequate iron intake; while calcium is provided from the dairy group. This is particularly important in vegetarian or restrictive diets, where plant sources of iron and calcium must be encouraged (NHS, 2011a). Although minimal increases in protein intake (an extra 6g per day) are recommended for pregnancy (Committee on Medical Aspects of Food Policy, 1991), protein aids satiety and so can be useful in limiting overeating.

Women are also encouraged to include plenty of fruit and vegetables (>5 per day) which are good sources of vitamins and minerals, while high in soluble fibre and low in sugar. Fruit contains natural sugar in the form of fructose which is released slowly from whole fruit but more rapidly from fruit juices or smoothies, causing a more rapid rise in blood glucose. Therefore women are encouraged to include more whole fruit and to limit their intake of juice or smoothies.

Vitamin D

Pregnant women with a BMI >30 kg/m^2 have an increased risk of vitamin D deficiency and should have 10 µg vitamin D supplements prescribed daily, during pregnancy and while breastfeeding (CMACE/RCOG, 2010).

Caffeine

The Department of Health recommends limiting caffeine intake to less than 200 mg per day (the equivalent of two cups of instant coffee) because high caffeine intakes are associated with low birth weight and miscarriage (NHS, 2011b). Energy drinks and cola can be very high in caffeine and sugar, so women are advised to try decaffeinated diet options or to have water instead (NHS, 2011b).

Conclusion

Healthcare professionals in the UK are facing increasing challenges in dealing with diabetes in pregnancy. As obesity in the general population continues to rise, more obese women will be presenting at antenatal clinic, with or without diabetes.

The current guidelines for the management of obesity in pregnancy are unhelpful,

especially when dealing with extreme obesity, because they fail to differentiate between degrees of obesity. Furthermore, they suggest that all women should gain weight, even those who are morbidly obese.

Dietary interventions that promote healthy eating and restrict added sugar and empty calories may help to prevent weight gain in pregnancy, while maintaining or improving the overall quality of the diet. This may result in safe weight loss during pregnancy, reducing the risk of complications, and may result in significant weight loss in the long term. ■

"Dietary interventions that promote healthy eating and restrict added sugar and empty calories may help to prevent weight gain in pregnancy, while maintaining or improving the overall quality of the diet."

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