Obesity

Which diet for weight reduction in type 2 diabetes?

Shahrad Taheri
Visiting Professor of Medicine, King's College London, London

With type 2 diabetes and obesity being closely linked, dietary advice and intervention for most people with type 2 diabetes should aim for both weight loss and improvement in glycaemic control. However, the majority of people who attempt it are unable to lose weight and/or maintain the weight loss. There are many reasons for this, involving multiple factors. A key factor is the inability to maintain a strict diet, as many diets exclude common foods. The panoply of different diets means that many obese individuals try several different approaches, each of which is associated with failure; this in turn jeopardises the next attempt at weight loss.

As carbohydrate intake is linked to glycaemia, there is great interest in the use of low-carbohydrate diets in people with type 2 diabetes. Tay and colleagues (their study summarised alongside) conducted a single-centre, randomised trial to compare low- and high-carbohydrate diets in overweight and obese people with type 2 diabetes over 52 weeks. Intensive support was provided every 2 weeks in the first 3 months, followed by monthly visits. Key foods and food vouchers were provided to participants. The participants had individualised energy restriction targets of about 30% in both diets. The low- and high-carbohydrate diets consisted of 14% and 53% energy from carbohydrate, respectively. For the high-carbohydrate diet, low-glycaemic-index foods were emphasised. Participants were also provided with 60-minute supervised exercise classes on three non-consecutive days per week.

The mean age of the 115 randomised participants was >50 years. Both groups had reductions in weight, waist circumference, HbA_{1c} (by about 11 mmol/mol [1.0%], despite fairly good control at baseline), and systolic and diastolic blood pressure (about 6–7 mmHg). There was no significant difference in weight loss (around 9%) or waist circumference reduction (9–10 cm) between the two diets. However, the low-carbohydrate group had a significantly greater reduction in triglyceride levels and diabetes medication requirements. The low-carbohydrate diet was also associated with lower glycaemic variability and less time spent in the hyperglycaemic range, as measured using continuous glucose monitoring.

As in most previous studies, the most significant weight loss occurred in the first 24 weeks. However, unlike in many studies, the weight loss was maintained up to 52 weeks. In a separate analysis of this cohort (Tay et al, 2015), the authors examined the impact of the diets on renal parameters and did not observe any adverse effects.

The key message from this study is that calorie restriction in the context of an intensive lifestyle intervention translates to meaningful weight loss and improvements in diabetes outcomes. Calorie reduction plays a significant role in improvement of diabetes in the context of obesity (Steven et al, 2015). One approach in achieving significant weight loss is the use of low-energy diets (Rehackova et al, 2015; see page 14). When calorie restriction is combined with intensive lifestyle support it can result in clinically significant changes in key diabetes and cardiovascular parameters (Look AHEAD Research Group, 2013). The diet advised and extent of calorie restriction should take into account individual preferences and lifestyle, with a view to sustainability. Increasingly, there is evidence that people with type 2 diabetes can have significant weight loss and improved outcomes that are comparable to obese people without diabetes (Brown et al, 2015). Given these findings, the ever-present question is why evidence-based lifestyle interventions are not employed in the daily clinical care of people with type 2 diabetes. ■

References on opposite page

Am J Clin Nutr

Comparison of low- and high-carb diet interventions for T2D

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓

1 In this randomised controlled trial, 155 obese adults with T2D (mean age, 59 years; BMI, 34.6 kg/m^2; HbA_{1c}, 56 mmol/mol [7.3%]) were assigned to either a low- or high-carbohydrate hypocaloric diet, combined with three 1-hour sessions of supervised exercise per week.

2 The low-carbohydrate diet comprised 14% of energy from carbohydrate, 28% from protein and 58% from fat (<10% saturated), whereas the high-carbohydrate diet comprised 53% from carbohydrate, 17% from protein and 30% from fat (<10% saturated). Both diets were set to restrict caloric intake by around 30%.

3 Over the 52-week trial, the low- and high-carbohydrate diets were similar in terms of completion rates (71% vs 65%) and reductions in weight (both 10 kg), blood pressure (7 mmHg vs 6 mmHg), HbA_{1c} (both 11 mmol/mol [1.0%]) and LDL-cholesterol levels (0.1 mmol/L vs 0.2 mmol/L).

4 However, the low-carbohydrate diet resulted in greater reductions in medication requirements, glycaemic variability on continuous glucose monitoring and triglyceride levels (0.4 mmol/L vs 0.01 mmol/L; P=0.001), as well as a greater increase in HDL-cholesterol (0.1 mmol/L vs 0.06 mmol/L; P=0.002).

5 The authors point out that their low-carbohydrate diet was also low in saturated fat, which may explain why it was more effective than low-carb diets in previous studies, which were typically high in saturated fat and which performed no better than a high-carb diet.

Tay J, Luscombe-Marsh ND, Thompson CH et al (2015) Comparison of low- and high-carbohydrate diets for type 2 diabetes management: a randomized trial. *Am J Clin Nutr* **102**: 780–90

Diabetologia

Sedentary time, physical activity and cardiometabolic risk in people with T2D

Readability	✓✓✓
Applicability to practice	✓✓✓
WOW! Factor	✓✓✓

1 These authors prospectively evaluated whether changes in sedentary time and physical activity over a 4-year follow-up affected cardiometabolic risk in overweight and obese people with T2D.

2 A total of 308 people (mean age, 61 years; BMI, 31.7 kg/m^2; waist circumference, 110 cm in men and 103 cm in women) had their physical activity and sedentary time assessed using a combined heart rate and movement sensor, worn continuously for ≥4 days, at baseline, after 1 year and after 4 years.

3 In general, baseline measures were not predictive of cardiometabolic risk at follow-up; however, change over the follow-up was.

4 People who increased their physical activity had a greater reduction in waist circumference (mean difference, –2.84 cm) compared with those who decreased their activity. Similarly, those who increased their sedentary time had a greater increase in waist circumference (+3.20 cm) compared with those who decreased it.

5 Increases in moderate-to-vigorous exercise were associated with reductions in systolic blood pressure (SBP; –6.30 mmHg), while increases in cardiorespiratory fitness were associated with reductions in cardiometabolic risk score (a combination of SBP, waist circumference, HDL-cholesterol and triacylglycerol scores) and waist circumference (–3.79 cm).

6 Further work is needed to assess whether these parameters can predict the risk of cardiovascular events.

Lamb MJ, Westgate K, Brage S et al (2016) Prospective associations between sedentary time, physical activity, fitness and cardiometabolic risk factors in people with type 2 diabetes. *Diabetologia* **59**: 110–20

Obes Surg

Protocol for glycaemic management post-bariatric surgery

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓

1 While remission of T2D is common after bariatric surgery, the duration before restoration of normoglycaemia is highly variable; therefore, this interdiscliplinary workgroup from the US developed a simple and safe protocol for glycaemic control in the inpatient setting and following discharge from surgery.

2 The inpatient protocol aims for a blood glucose target of 6.7–10.0 mmol/L, with fingerstick testing every 6 hours. An algorithm for insulin titration (and glucose tablets/dextrose infusions to correct hypoglycaemia) to ensure this is provided.

3 Metformin should be discontinued until 2–3 weeks post-discharge, once gastrointestinal symptoms have abated. A dipeptidyl peptidase-4 inhibitor can be considered in people with insulin glargine requirements <50 units/day; however, sulfonylureas and glucagon-like peptide-1 analogues are contraindicated.

4 Post-discharge, patients should aim for blood glucose levels of 6.7–10.0 mmol/L, with fingerstick testing at least twice daily. They should follow-up with primary care or their endocrinologist within 2–4 weeks.

5 Other suggestions on diet, post-discharge insulin requirements and post-discharge hypoglycaemia are made.

6 This protocol is easily followed, can be predominantly nurse-led and should have a low risk of hypoglycaemia; however, the authors note that it is not appropriate for people with T1D or massive insulin requirements pre-surgery.

Machnica K, Pannain S, Schulwolf E et al (2015) Inpatient glycemic protocol for patients with diabetes undergoing bariatric surgery. *Obes Surg* **25**: 2200–4

Diabetes Care

Effect of energy restriction on cardiac autonomic function in obese people with T2D

Readability	✓✓✓
Applicability to practice	✓✓✓
WOW! Factor	✓✓✓

1 The authors of this randomised pilot study sought to determine whether two low-energy diets differing in fibre, red meat and coffee intake could affect cardiac autonomic function in 26 obese people with short-duration (≤5 years) T2D.

2 Both diets provided a median caloric deficit of 285 kcal/day and provided 50% of energy from carbohydrate, 30% from fat and 20% from protein. The first diet was high in cereal fibre, free of red meat and high in coffee (five or more cups per day), whereas the second was low in fibre, high in red meat and free of coffee or tea.

3 After 8 weeks, both interventions resulted in a mean weight loss of 5–6 kg, a mean decline in heart rate of 4–6 bpm and an improvement in vagally mediated heart rate variability; however, these outcomes did not significantly differ between the groups.

4 In the whole cohort, increased vagal activity was associated with enhanced oxidative glucose utilisation and diminished fat oxidation, but not changes in insulin sensitivity or subclinical inflammation.

5 The authors conclude that energy restriction, but not diet composition *per se*, contributes to improved cardiac vagal function. Large-scale studies will be required to confirm these findings and determine whether these effects translate to a reduction in cardiovascular endpoints.

Ziegler D, Strom A, Nowotny B et al (2015) Effect of low-energy diets differing in fiber, red meat, and coffee intake on cardiac autonomic function in obese individuals with type 2 diabetes. *Diabetes Care* **38**: 1750–7

> ***"The authors conclude that energy restriction, but not diet composition per se, contributes to improved cardiac vagal function."***

References from commentary

Brown A, Gouldstone A, Fox E et al (2015) Description and preliminary results from a structured specialist behavioural weight management group intervention: Specialist Lifestyle Management (SLiM) programme. *BMJ Open* **5**: e007217

Look AHEAD Research Group (2013) Cardiovascular effects of intensive lifestyle intervention in type 2 diabetes. *N Engl J Med* **369**: 145–54

Rehackova L, Arnott B, Araujo-Soares V et al (2015) Efficacy and acceptability of very low energy diets in overweight and obese people with type 2 diabetes mellitus: a systematic review with meta-analyses. *Diabet Med* 22 Oct [Epub ahead of print]

Steven S, Carey PE, Small PK, Taylor R (2015) Reversal of type 2 diabetes after bariatric surgery is determined by the degree of achieved weight loss in both short- and long-duration diabetes. *Diabet Med* **32**: 47–53

Tay J, Thompson CH, Luscombe-Marsh ND et al (2015) Long-term effects of a very low carbohydrate compared with a high carbohydrate diet on renal function in individuals with type 2 diabetes: a randomized trial. *Medicine (Baltimore)* **94**: e2181