

Paediatrics



Very-low-energy diets: The future first-line intensive treatment for youth-onset type 2 diabetes?

Juliana Chizo Agwu

Consultant Paediatrician, Sandwell and West Birmingham Hospital Trust, Birmingham

The rise in childhood obesity has been associated with more children and young people being diagnosed with type 2 diabetes. Other risk factors for developing youth-onset type 2 diabetes include minority ethnic origin, family history of type 2 diabetes and the presence of signs of insulin resistance. Previous studies have shown that early-onset type 2 diabetes appears to be more aggressive than the adult-onset form of the condition, as people diagnosed with type 2 diabetes in youth have a much higher risk of cardiovascular events than those with who are diagnosed in adulthood (Hillier and Pedula, 2003). Compared to age-matched controls, young people with type 2 diabetes lose approximately 15 years from average remaining life expectancy and may experience severe, chronic complications of the condition by their forties (Rhodes et al, 2012). In addition, people who developed type 2 diabetes in their youth have been shown to have a significantly increased risk of microvascular complications compared to age-matched controls with type 1 diabetes, despite good glycaemic control (Hillier and Pedula, 2003).

Metformin and insulin are currently the only licensed therapeutic agents for early-onset type 2 diabetes; however, the TODAY (Treatment Options for type 2 Diabetes in Adolescents and Youth) study showed that lifestyle modification in conjunction with metformin was not effective in half of the young people enrolled (Narasimhan and Weinstock, 2014). The treatment failure rate of metformin reported in TODAY appears to be higher than that which is observed in older adults with type 2 diabetes.

Given the rather grim prognosis of youth-onset type 2 diabetes, the study by Gow et al (summarised alongside), which suggests that a very-low-energy diet (VLED) can reverse type 2

diabetes in young people, is very encouraging. In this pilot study, eight young people aged 7–16 years with type 2 diabetes and obesity followed a VLED (~800 kcal/day) for 8 weeks and then changed to a hypocaloric diet (~1500 kcal/day) until follow-up at 34 weeks. Five of the eight participants adhered to the diets and lost an average of 12.3% of body weight at 34 weeks. Compared with baseline, there was a significant improvement in glycaemic control. All of the three participants who were on insulin therapy at baseline were able to discontinue it during the 8-week VLED and remained off therapy throughout the trial. More significantly, four of the five completers no longer met any diagnostic criteria for type 2 diabetes at the end of the study.

These findings are similar to studies in adults, which have shown that VLEDs are capable of reversing type 2 diabetes. Although this was a very small study with no control arm and of a short duration, the findings are very encouraging. The benefits of reversing type 2 diabetes in the long term may include fewer complications, with a reduction in healthcare costs as well as an extended lifespan for the individual. The only other therapy previously shown to reverse youth-onset type 2 diabetes is bariatric surgery. However, the long-term physical and psychological effects of this are unknown. VLEDs may be a safer option and could thus become the first-line treatment for young people who are able to adhere to such a strict regimen. ■

Hillier TA, Pedula KL (2003) Complications in young adults with early-onset type 2 diabetes: losing the relative protection of youth. *Diabetes Care* **26**: 2999–3005

Narasimhan S, Weinstock RS (2014) Youth-onset type 2 diabetes mellitus: lessons learned from the TODAY study. *Mayo Clin Proc* **89**: 806–16

Rhodes ET, Prosser LA, Hoerger TJ et al (2012) Estimated morbidity and mortality in adolescents and young adults diagnosed with type 2 diabetes mellitus. *Diabet Med* **29**: 453–63

Diabetologia

A very-low-energy diet reverses youth-onset T2D

Readability ////

Applicability to practice ///

WOW! Factor ////

1 In this pilot study, the authors sought to assess the tolerability and effects of a very-low-energy diet (VLED), along with regular dietitian support, in eight obese children and young people with T2D.

2 The VLED comprised four formula meal replacements, forming around 800 kcal/day, for a period of 8 weeks. Thereafter, following a 3-week period to reintroduce normal food, participants followed a standard energy-deficit diet of around 1500 kcal/day until 34 weeks' follow-up.

3 After the 8-week VLED period, mean 2-hour glucose, HbA_{1c}, total cholesterol and liver fat levels had fallen in the overall cohort. Five of eight participants lost ≥5% body weight and were deemed to be adherent to the diet.

4 At 34 weeks, four of the five adherers no longer met any diagnostic criteria for diabetes. The median weight loss was 6.7 kg (range, 3.4–13.2 kg), or 12.3% of body weight. Four achieved further weight loss on the calorie-controlled diet, while one gained 3.6 kg.

5 Three participants were receiving insulin therapy at the study beginning; however, all three were able to discontinue and stay off therapy during the course of the study.

6 Four of eight participants rated the taste as the worst thing about the VLED diet and regimen.

7 The authors conclude that VLEDs are a feasible and acceptable treatment option for some young people with type 2 diabetes.

Gow ML, Baur LA, Johnson NA et al (2016) Reversal of type 2 diabetes in youth who adhere to a very-low-energy diet: a pilot study. *Diabetologia* **60**: 406–15

Diabetes Technol Ther

Webcam clinics for young people: Pilot study

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

1 The CoYoT1 (Colorado Young Adults with T1D) Clinic was designed to address several of the barriers to engaging young adults in their diabetes care by making clinics more accessible via webcam.

2 The virtual clinics comprise a 20–30-minute individual appointment with a clinician and a 30-minute group session with a diabetes educator and four patients.

3 The individual appointments are to discuss glucose data, diabetes management and any barriers to good control, while the group sessions comprise patient-driven, facilitator-mediated education on topics relevant to the attendees.

4 In this pilot study, 45 young people (18–25 years of age) attended the virtual clinics and completed a satisfaction survey, and the time saved was calculated.

5 Including travel time and mornings/afternoons taken out of school or work, the virtual clinic saved 5.97 hours compared with a typical in-person clinic visit.

6 Attendees reported high satisfaction with the virtual clinic (mean total satisfaction score, 51.7 out of a possible 60). They were comfortable using the videoconference technology and 70% liked talking to others with their condition in the group sessions (27% were neutral and 3% disliked it).

7 The authors note the lack of a control group and the potential selection bias; however, this model may be a helpful way to improve engagement in this hard-to-reach patient group.

Raymond JK, Berget CL, Driscoll KA et al (2016) CoYoT1 Clinic: innovative telemedicine care model for young adults with type 1 diabetes. *Diabetes Technol Ther* **18**: 385–90

Diabet Med

Risk of DR at first screen in children aged 12 years

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

1 These authors evaluated data from four screening centres across the UK to determine the rates of diabetic retinopathy (DR) in 2125 children with diabetes attending their first eye screen at age 12–13 years.

2 Only three children had referable DR at first screen.

3 Of 1703 children with subsequent images available over a follow-up of 3.1 years, 25 developed referable DR, an incidence of 4.7 per 1000 people per year.

4 Longer diabetes duration at baseline screening was associated with the risk of progressing to referable DR over the follow-up.

5 These findings support the UK's policy of screening people with diabetes aged ≥12 years and suggest that earlier screening is not beneficial.

Scanlon PH, Stratton IM, Bachmann MO et al (2016) Risk of diabetic retinopathy at first screen in children at 12 and 13 years of age. *Diabet Med* **33**: 1655–8

Diabetes Care

HbA_{1c} is a valid predictor of T2D risk in children

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

1 In this longitudinal study, the authors assessed the accuracy of HbA_{1c} as a predictor of T2D development in later life in a cohort of 2095 American Indian children.

2 Over a median follow-up of 5.2 years, compared to those

with an HbA_{1c} ≤34 mmol/mol (5.3%), the T2D incidence rate was four times higher in boys with an HbA_{1c} of 39–46 mmol/mol (5.7–6.4%), and seven times higher in girls.

3 The sensitivity and specificity of HbA_{1c} were similar to those of fasting and 2-hour plasma glucose levels.

4 The incidence rate ratios in children with high vs low HbA_{1c} were greater than those in a cohort of adults from the same community.

5 The authors conclude that HbA_{1c} is a useful predictor of diabetes risk in children; however, studies in other ethnic groups are required.

Vijayakumar P, Nelson RG, Hanson RL et al (2017) HbA_{1c} and the prediction of type 2 diabetes in children and adults. *Diabetes Care* **40**: 16–21

Diabetes Care

24-hour use of a closed-loop system in adolescents

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

1 In this open-label, randomised crossover study, 24-hour home use of a hybrid closed-loop insulin delivery system (basal doses delivered automatically, with mealtime doses according to a standard bolus calculator delivered manually) was compared with

sensor-augmented pump therapy, each for 3 weeks, in 12 adolescents with poor glycaemic control.

2 The primary outcome, the proportion of time spent in the target glucose range of 3.9–10.0 mmol/L, was significantly greater in the closed-loop arm (66.6% vs 47.7%; *P*<0.001).

3 The time spent in hypoglycaemia was similar in the two arms, at 4% and 2%, respectively.

4 Free-living, home use of this closed-loop system appears to be safe, feasible and effective in this age group.

Tauschmann M, Allen JM, Wilinska ME et al (2016) Home use of day-and-night hybrid closed-loop insulin delivery in suboptimally controlled adolescents with type 1 diabetes: a 3-week, free-living, randomized crossover trial. *Diabetes Care* **39**: 2019–25

“These findings support the UK's policy of screening people with diabetes aged ≥12 years and suggest that earlier screening is not beneficial.”