

Obesity



Weight loss and metabolism: Is water best?

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

Losing weight and maintaining a lower body weight thereafter can be challenging. A common misconception amongst people who want to lose weight is that drinking fruit juice is healthy. However, fruit juice contains calories, is usually drunk in excess and often contains added sugar. Another misconception is that energy drinks are healthy. Frequently, advertising for these high-calorie drinks depict athletes drinking them, whereas the significant majority of the population is sedentary. The beverage industry has done a good job in changing attitudes, and perhaps even palates, and water generally seems to be avoided. Then there is the bottled water industry, which discourages drinking tap water and prices its bottled water higher than some sugar-sweetened beverages. Individuals often switch to “diet” labelled beverages in order to aid weight loss and avoid weight gain.

Which is better for weight loss: diet beverages or water? To answer this question, Madjd and colleagues conducted a 24-week randomised controlled trial (summarised alongside) that included 81 obese women with type 2 diabetes undergoing a weight loss programme. The women were randomised to drink either water or a diet beverage after their main meal (lunch). The primary outcome was weight loss at 24 weeks. Women who drank water lost more weight, although the between-groups difference was small (just over 1 kg). Similar weight loss has been observed in obese women without type 2 diabetes in a previous study by the same group (Madjd et al, 2015).

Interestingly, at 24 weeks, the water group were consuming fewer calories (about 42 kcal less per day) and had lower carbohydrate intake (16.1 g less) than the diet drink group. This fits in with previous suggestions that artificial sweeteners in diet beverages increase a person's desire for high-sugar, high-energy food and drinks. Of particular interest was the greater improvement in insulin sensitivity and reduction in insulin dose in the water-drinking group.

There were several limitations to this study, including its small numbers, short-term nature and lack of more accurate measures of body composition. The timing of drink intake in relation to the meal is also likely to be important. Parretti et al (2015) observed that water preloading before meals was associated with around 1 kg greater weight loss. It is also difficult to exclude the behavioural effect of being in a particular group, difficult to monitor adherence and difficult to determine the volume of drinks consumed.

In another recent study, Wong et al (2017) examined whether giving advice on water intake had beneficial effects on body weight in adolescents. The study included 38 adolescents who reported drinking four cups of water or fewer per day. The water advice group were advised to drink eight cups of water per day. Both groups were drinking around two cups of water daily at the beginning. At 6 months, the water advice group reported drinking 4.8 cups per day compared to 3.5 cups per day in the control group. Only one individual in the water advice group drank more than eight cups a day. Energy intake was non-significantly lower in the water advice group by 13 kcal, and carbohydrate intake was also reduced non-significantly. There was no difference in BMI between the groups at 6 months. In this study, an insufficient number of adolescents achieved the recommended level of water intake, which could have diminished the significance of the outcome.

The study by Madjd and colleagues provides key data regarding the impact of water, as opposed to diet beverages, on body weight and metabolic parameters. It appears, however, that persuading adolescents to increase their water intake is a major challenge. Sadly, adolescents are a key target for the beverage industry. Further studies will be needed to examine the impact of water intake on weight loss. In the meantime, continuing with the common dietary advice that water is best seems most appropriate. ■

Diabetes Obes Metab

Water superior to diet drinks in terms of weight loss

Readability ////
Applicability to practice ////
WOW! Factor ////

1 These authors have previously shown that replacing artificially sweetened diet drinks with water aided weight loss in obese women without diabetes who were on a calorie-deficit diet. In the current study, they sought to repeat this protocol in overweight or obese women with T2D.

2 In a private weight loss clinic in Iran, 81 adult women with a BMI of 27–35 kg/m² and T2D treated with metformin alone were randomised to drink 250 mL of either water or diet soda once daily after lunch, 5 days a week, whilst on a hypocaloric diet designed to promote weight loss of 0.5–1 kg per week over 24 weeks.

3 Overall, 65 participants (80%) completed the intervention. In the intention-to-treat analysis, while both groups had lost weight at 24 weeks, the weight reduction was significantly greater in the water group (6.40 kg vs 5.25 kg; *P*=0.006).

4 In general, other metabolic and anthropometric measures improved in both groups; however, reductions in BMI (2.50 vs 2.05 kg/m²), fasting plasma glucose (1.63 vs 1.29 mmol/L), fasting serum insulin levels (5.72 vs 2.48 milliunits/L) and the homeostasis model assessment of insulin resistance (3.20 vs 2.49) were all significantly greater in the water group.

5 The water group also had a significantly greater reduction in estimated daily energy intake over the course of the study (417 vs 330 kcal), possibly suggesting that drinking water led to better diet adherence.

Madjd A, Taylor MA, Delavari A et al (2017) Beneficial effects of replacing diet beverages with water on type 2 diabetic obese women following a hypo-energetic diet: a randomized, 24-week clinical trial. *Diabetes Obes Metab* **19**: 125–32

References on following page

Diabetes Care

Changes in diet quality and T2D risk over time

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

- Most studies on the effects of dietary patterns on T2D risk have been conducted using measures of diet quality at baseline only. Therefore, these authors sought to assess diet quality every 4 years over a follow-up of ≥ 20 years to determine the risk of developing T2D.
- A total of 124 607 adults enrolled in three prospective studies in the US, all without T2D at baseline, were evaluated. Dietary intake was measured with a semiquantitative food frequency questionnaire every 4 years. Diet quality was evaluated with the Alternate Healthy Eating Index (AHEI).
- Over 2 093 416 person-years of follow-up, there were 9361 cases of incident T2D. Compared with people whose diet quality remained stable in each 4-year period, a $>10\%$ reduction in AHEI score (indicating a worsening diet) was associated with higher subsequent risk of T2D (hazard ratio [HR], 1.34; 95% confidence interval [CI], 1.23–1.46).
- Conversely, a $>10\%$ improvement in AHEI score was associated with lower T2D risk (HR, 0.84; 95% CI, 0.78–0.90).
- The associations were significant independently of BMI and diet quality at baseline, and of changes in physical activity across the study period. Changes in body weight explained only 32% of the association between AHEI score and T2D risk.
- These findings support current dietary advice to reduce the risk of T2D; however, analysis of the individual dietary components is still lacking.

Ley SH, Pan A, Li Y et al (2016) Changes in overall diet quality and subsequent type 2 diabetes risk: three U.S. prospective cohorts. *Diabetes Care* **39**: 2011–8

Diabetes Obes Metab

EndoBarrier: Effects in obese people with or without T2D

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

- The EndoBarrier is a duodenal–jejunal gastric sleeve designed as a minimally invasive, endoscopically deployable and fully reversible mimic of Roux-en-Y gastric bypass (RYGB). Ingested foods flow directly from the stomach through the pylorus into the sleeve, which prevents contact with the mucosa in the upper part of the small intestine.
 - These authors sought to investigate the effect of the EndoBarrier on glucose metabolism, gut hormone secretion, appetite and food intake in obese people, nine of whom had T2D and 10 of whom had normal glucose tolerance (NGT).
 - Compared with pre-implantation, the EndoBarrier resulted in weight loss of 6–7 kg, including reductions in total body fat and visceral fat levels, in both groups of participants at 26 weeks.
 - Small but significant increases in postprandial (mixed meal test) levels of glucagon-like peptide-1 and peptide YY occurred in the T2D group but not the NGT group. Other changes in postprandial physiology were marginal or absent.
 - Therefore, the authors conclude that the EndoBarrier only mimics the restrictive effects of RYGB, not the physiological effects.
 - These results, the high rates of adverse events and the fact that a recent randomised, sham-controlled study was stopped for safety concerns suggest that the EndoBarrier is not feasible as the standard of care for obesity and T2D.
- Rohde U, Federspiel CA, Vilmann P et al (2017) The impact of EndoBarrier gastrointestinal liner in obese patients with normal glucose tolerance and in patients with type 2 diabetes. *Diabetes Obes Metab* **19**: 189–99

Diabet Med

Mechanisms behind the early improvement in glycaemic control after RYGB

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

- These authors compared the metabolic effects of Roux-en-Y gastric bypass (RYGB) and a very-low-calorie diet (VLCD) in the first week after intervention, in order to determine the mechanisms behind the early improvement in glycaemic control that is seen following RYGB.
 - Obese people with T2D who were scheduled to undergo RYGB ($n=18$) were randomised to undergo the procedure or receive a 700-kcal/day VLCD. After a week, participants were given a semi-solid meal (porridge) and glycaemic and hormonal variables were measured.
 - After 1 week, weight loss was significantly greater in the RYGB group; however, this difference was explained by greater reductions in lean mass and body water.
 - Post-meal, there was a greater increase in plasma glucose levels in the RYGB group, and this was associated with a seven-fold increase in glucagon-like peptide-1 (GLP-1) levels compared with the VLCD group.
 - However, this did not translate into a greater improvement in fasting glucose or area under the glucose curve.
 - The authors conclude that the early increase in glycaemic control post-RYGB results from energy restriction rather than increased GLP-1 levels. They note, however, that these conclusions are limited to the early post-RYGB phase.
- Steven S, Hollingsworth KG, Small PK et al (2016) Calorie restriction and not glucagon-like peptide-1 explains the acute improvement in glucose control after gastric bypass in type 2 diabetes. *Diabet Med* **33**: 1723–31

“These findings support current dietary advice to reduce the risk of T2D; however, analysis of the individual dietary components is still lacking.”

References from commentary

Macjrd A, Taylor MA, Delavari A et al (2015) Effects on weight loss in adults of replacing diet beverages with water during a hypocaloric diet: a randomized, 24-wk clinical trial. *Am J Clin Nutr* **102**: 1305–12

Parretti HM, Aveyard P, Blannin A et al (2015) Efficacy of water preloading before main meals as a strategy for weight loss in primary care patients with obesity: a randomized clinical trial. *JAMA Pediatr* **23**: 1785–91

Wong JM, Ebbeling CB, Robinson L et al (2017) Effects of advice to drink 8 cups of water per day in adolescents with overweight or obesity: a randomized clinical trial. *JAMA Pediatr* **6 Mar** [Epub ahead of print]