

Position statement

Low-carb diets for people with diabetes

Last reviewed: May 2017

KEY POINTS:

- Low-carbohydrate diets can be safe and effective in the short term in managing weight, and improving glycaemic control and cardiovascular risk in people with Type 2 diabetes.
- People who chose to follow a low-carb diet should be supported to make changes to relevant diabetes medications and to monitor blood glucose to reduce the risk of hypoglycaemia.
- There is absence of strong evidence to recommend low-carb diets to people with Type 1 diabetes.
- There is evidence that low-carb diets can affect growth in children and should not be recommended.
- Whether people chose to follow a low-carb diet or not, they should be encouraged to include foods with good evidence to support health. This includes fruit and vegetables, wholegrains, dairy, seafood, pulses, and nuts.
- People should be encouraged to reduce their intake of red meat and processed meat, sugar-sweetened foods, particularly sugar-sweetened drinks, and refined grains such as white bread.

Introduction

The role of carbohydrate (carb) foods in the diet is often misunderstood and has been hotly debated over recent years. Many question the need for carbohydrates and how much to include in the diet.

In response to many enquiries from people with diabetes, healthcare professionals and the general public, Diabetes UK has produced this information to clarify our position on carbohydrates for people with diabetes. This position is based on Diabetes UK's evidence-based nutrition

guidelines published in 2011 and subsequent updates from relevant publications. The 2011 guidelines working group consisted of independent researchers and experts in the field of diet and diabetes, and the key recommendations were published in a peer-reviewed journal [1].

Background

The role of carbohydrate in the diet

Most carbohydrates are broken down into glucose which is an essential fuel for the

brain [2]. Generally, the body aims to maintain a tight control of glucose levels in the bloodstream, keeping a store of extra glucose as glycogen in the liver and the muscles for times when fasting or when extra glucose is needed. However, diabetes affects how the body controls glucose levels in the blood, and how stored glucose in the liver is released.

The different types of carbohydrates present in food

Carbohydrates can be categorised in different ways and one pragmatic way is into:

- **Starchy foods:** these include bread, pasta, potatoes, yams, breakfast cereals and couscous.
- **Sugars:** these can be subdivided into
 - Naturally occurring sugars found in whole fruits (fructose), milk and milk products (lactose).
 - Free sugars added to foods like sweets, chocolate, sugary drinks and desserts plus the sugar in fruit juices, fruit concentrates, syrups and honey [3].

Fibre is also an important type of carbohydrate. This type of carbohydrate is not digested and therefore does not increase blood glucose levels. There are two types of fibre:

- Insoluble fibre – is found in wholemeal bread, brown rice and wholegrain cereals. This type of fibre helps keep the digestive system healthy.
- Soluble fibre – is found in fruit and vegetables, pulses, oats and barley. This type of fibre has been reported to modestly reduce blood cholesterol levels.

Many plant foods, such as fruits, vegetables, wholegrains and pulses, are

high in fibre and have a combination of these two types of fibre.

The Scientific Advisory Committee on Nutrition (SACN) recommend that free sugars should account for no more than 5 per cent of daily energy intake. SACN also recommends that adults (16 years and over) should consume 30g of fibre per day [3], by consuming more fruit and vegetables, and wholegrains. The fibre recommendation is based on the evidence that high-fibre diets help to keep the gut healthy and are associated with lower risk of certain health conditions such as bowel cancer.

Amount of carbohydrate needed in the diet

The amount of a carbohydrate a person needs to eat will depend on their gender, age and activity levels as well as the goals they are trying to achieve such as trying to lose weight or improve blood glucose levels. There is currently no consistent robust evidence to recommend the ideal amount of carbohydrate for everyone with diabetes [1].

As the total amount of carbohydrate eaten has the biggest effect on the rise of blood glucose levels after eating, some experts have argued that everyone with diabetes should follow a low-carbohydrate diet [4]. However, this call for low-carb diets as a default for people with diabetes is based on opinions rather than robust science. Interpreting dietary research is not without disagreements, which is why Diabetes UK continues to base recommendations on robust evidence rather than opinions. There is currently no agreed universal definition amongst researchers regarding the amount of carbohydrate in low-carb diets. One consistent definition has been <130g of carbs per day but other definitions also exist.

Table 1 Taxonomy of diets containing differing amounts of carbohydrate

Description	Amount of carbohydrate	
	g/day	% total energy intake
Very low carbohydrate ketogenic diet	20–50	≤10
Low carbohydrate	<130	<26
Moderate carbohydrate	130–230	26–45
High carbohydrate	>230	>45

Adapted from Feinman et al. [4]

Current evidence

Carbohydrate and Type 1 diabetes

If a person with Type 1 diabetes is of a healthy weight (i.e. they do not wish to lose any weight) and they have good glycaemic control, they do not need to reduce their carbohydrate intake. If a person with Type 1 diabetes is overweight and is trying to lose weight, then reducing their overall energy intake including calories from carbohydrates, fats, proteins and alcohol will help. It is important that they should consult their healthcare team for specific advice, as they may need to adjust their insulin to reflect the reduction in carbohydrates in order to reduce the risk of hypoglycaemia.

Some people with Type 1 diabetes may choose to reduce their carbohydrate intake in order to manage their glycaemic control and reduce their insulin intake. However, intervention studies have failed to show any significant effect on glycaemic control of manipulating carbohydrates in people with Type 1 diabetes [1].

A small clinical audit showed that highly motivated people with Type 1 diabetes, attending an education course, that incorporated a low-carb diet led to reduction in insulin doses and improvement in HbA1c [5]. A more recent feasibility study which involved 10 people

with Type 1 diabetes, also concluded that a low-carb diet is a feasible option for people with Type 1 diabetes, and may be of benefit in reducing insulin doses and improving glycaemic control, particularly for those wishing to lose weight [6]. Even though these findings are encouraging, they cannot form a basis for recommendations as the studies are limited in size and robustness of their methodology.

There is currently insufficient robust evidence to show whether following a low-carb diet is effective in managing Type 1 diabetes in the long term. There is also no published evidence to determine the long-term effects of low-carb diets on the overall health of people with Type 1 diabetes. Evidence from larger and longer-term studies over a minimum of 12–24 months would be required [6] to justify any potential recommendations on low-carb diets for people with Type 1 diabetes. In the absence of such strong evidence, this dietary approach cannot be recommended to people with Type 1 diabetes.

The best evidence for an effective strategy of improving glycaemic control in Type 1 diabetes is matching insulin on a meal-by-meal basis to the amount of carbohydrate consumed. Randomised controlled trials have shown that carbohydrate counting can improve glycaemic control, quality of life and general wellbeing without increases in severe hypoglycaemic events, body weight or blood lipids [1].

Carbohydrates and Type 2 diabetes

Weight management should be the primary nutritional strategy in managing glucose control in Type 2 diabetes for people who are overweight or obese [1]. Restricting calorie intake can lead to weight loss, and there are a variety of ways to achieve calorie restriction and weight loss [7]. Some people with Type 2 diabetes may choose to follow a low-carb diet in order to lose weight and to manage their blood glucose.

There is evidence to suggest that low-carb diets are safe and effective in the short term for improvements in glycaemic control, weight loss and cardiovascular risk in people with Type 2 diabetes. But there is no clear indication that low-carb diets are superior to other approaches in the long term. Individual studies that have looked at effectiveness of low-carb diets in the management of Type 2 diabetes, have reported inconsistent differences in glycaemic control, weight, blood lipids and blood pressure between diets low in carbohydrates and diets high in carbohydrates [7–9].

Recent systematic reviews and meta-analyses including people with Type 2 diabetes report that although low-carb diets may lead to significantly greater weight loss and improvements in HbA1c and lipids over the short term, there is no greater advantage over the longer term when compared to other diets [10–13]. This reinforces Diabetes UK's call for an individualised approach to diet, taking into consideration people's personal preferences [1].

Studies on very low-carb ketogenic diets have suggested that these may not be sustainable over a medium to longer term as carbohydrate intake in the different diets within studies often converged toward a more moderate level [8].

What about children with diabetes?

Low-carb diets should not be recommended to children with diabetes. Low-carb diets in children can lead to growth failure, increased risk of cardiovascular diseases, and may contribute to psychological problems [14]. Children require adequate nutrients for growth and good health so restricting foods with essential nutrients can lead to nutrient deficiencies which can have long-term effects on their health. There is no evidence that low-carb diets are beneficial in children with diabetes.

Recommendations

- A range of approaches to weight loss should be considered with the overall aim of energy intake being less than energy expenditure; and that the most appropriate dietary approach to achieve this is identified between the person with diabetes and their dietitian.
- A low-carbohydrate diet should not be regarded as a more superior or a better approach than other strategies as consistent evidence shows that total energy intake is the main predictor for weight loss.
- When considering a low-carb diet as an option, people with diabetes should be made aware of possible side effects such as the risk of hypoglycaemia, and should be supported to manage such risks.
- If people with diabetes do choose to follow a low-carb diet, diabetes control should be considered and blood glucose levels need to be closely monitored with adjustments to medications as required.

- The amount of carbohydrate to be restricted should be agreed between the person with diabetes and their dietitian.
- People who want to follow a low-carb diet should ensure their fat intake comes mainly from unsaturated sources, whilst limiting saturated fat intake. They should also include foods high in fibre as part a healthy diet.
- Whether people choose to follow a low-carb diet or not, they should be encouraged to choose healthier carbohydrates, such as fruits, vegetables, whole grains and pulses and reduce intake of unhealthier carbs such as, from refined sources, including white bread and white rice and particularly sugar and sugar-sweetened beverages (SSB).
- There is currently no strong evidence to recommended low-carb as an option for people with Type 1 diabetes. For people with Type 1 diabetes matching insulin to the amount of carbohydrate consumed is an effective strategy in improving glycaemic control.
- There are serious concerns about low-carb diets for children with diabetes due to effects on growth. Therefore, low-carb diets should not be recommended for children with diabetes.

Conclusion

There is a lot of debate around carbohydrate intake in people with diabetes.

For people with Type 1 diabetes there is good evidence that the most effective strategy to improve glycaemic control is to match insulin on a meal-by-meal basis to the amount of carbohydrate consumed. For people with Type 2 diabetes who wish to lose weight there is evidence to suggest that low-carbohydrate diets are safe and effective in the short term. However, a low-carb diet should not be regarded as a better approach than other strategies. The evidence shows that total energy intake is the main predictor of weight loss so people should be encouraged to choose an approach they prefer.

Having diabetes does not insulate people from other health conditions such as cancers. Therefore, whichever eating plan people choose to follow should be within the broader context of a healthy diet to promote long term health. The diet should provide optimal amounts of vitamins, minerals and fibre, and the specific foods within the diets should have robust evidence and consensus to promote good overall health. This means encouraging people to eat more vegetables, fruits, wholegrains, dairy, seafood, pulses, and nuts. People should also be encouraged to reduce their intake of red meat and processed meat, sugar-sweetened foods, particularly sugar-sweetened drinks, and refined grains such as white bread.

People with diabetes should have opportunities to discuss their individual goals and dietary plans with a dietitian so that they are informed and supported to achieve these safely.

Further information

- Diabetes UK (2011). Evidence-based nutrition guidelines for the prevention and management of diabetes:
<https://www.diabetes.org.uk/Documents/Reports/nutritional-guidelines-2013-amendment-0413.pdf>
- Diabetes UK and British Dietetic Association (2015). Policy statement: Dietary fat consumption in the management of Type 2 diabetes:
https://www.diabetes.org.uk/About_us/What-we-say/Food-nutrition-lifestyle/Dietary-fat-consumption-in-the-management-of-Type-2-diabetes/
- More information on fibre:
<https://www.diabetes.org.uk/Guide-to-diabetes/Enjoy-food/Carbohydrates-and-diabetes/fibre-and-diabetes/>
- Different dietary approaches to weight loss:
<https://www.diabetes.org.uk/Guide-to-diabetes/Enjoy-food/Eating-with-diabetes/Whats-your-healthy-weight/>

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balanced diets for reducing weight and cardiovascular risk: a systematic review and meta-analysis. *PLoS One*. 2014;9:e100652.

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