

Impact of a Low-Carbohydrate Compared with Low-Fat Breakfast on Blood Glucose Control in Type 2 Diabetes: A Randomized Trial

Oliveira BF, Chang CR, Oetsch K et al. Impact of a low-carbohydrate versus low-fat breakfast on blood glucose control in type 2 diabetes: a randomized trial. *Am J Clin Nutr.* 2023 Apr 28;S0002-9165(23)48890-9. doi: 10.1016/j.ajcnut.2023.04.032.

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Background:

Carbohydrate intake directly influences postprandial glucose levels and affects overall glycemic control in individuals with diabetes.¹ Evidence has shown that reducing carbohydrate intake is a dietary strategy to improve glucose control.^{2,3} A higher carbohydrate intake in the morning leads to higher markers of glycemic variability, when compared with lower carbohydrate intake.⁴ One potential strategy to mitigate hyperglycemic excursions, without following a strict low carbohydrate diet, is to manipulate only one of the daily meals.

Objective:

The aim of this randomized controlled trial was to determine if advice and guidance to regularly consume a low-carbohydrate breakfast (LC), when compared with a low-fat breakfast (CTL), could lead to clinically meaningful improvements in glycemic control in individuals with type 2 diabetes (T2D).

Methods:

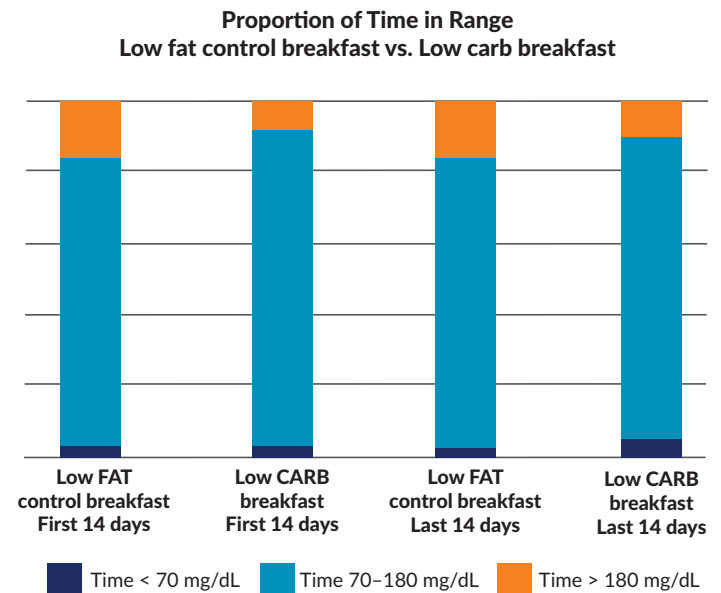
- This study was a 12-wk, 2-site parallel-arm RCT conducted remotely during the COVID-19 pandemic with 127 adults with type 2 diabetes randomly allocated to a low carbohydrate (LC) breakfast (n=64) or a low-fat control (CTL) breakfast (n =63). Exclusion criteria included HbA1c > 8.5%, individuals on insulin, or > 2 glucose lowering medications.
- Each group was provided with a menu of 8–10 breakfast recipes designed by registered dietitians at each site to provide ~450 kcal. According to their randomization, participants were instructed to select from a menu of low carbohydrate breakfasts (~25 g protein, 8 g carbohydrates, and 37 g fat; e.g., omelet with cheese and non-starchy vegetables) or low-fat control breakfasts (~20 g protein, 56 g carbohydrates, and 15 g fat; e.g., oatmeal and fruit based) each morning.

References:

- Suh S, Kim JH. Glycemic Variability: How Do We Measure It and Why Is It Important? *Diabetes Metab J.* 2015 Aug;39(4):273-82.
- Evert AB, Dennison M, Gardner CD et al. Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care.* 2019 May;42(5):731-754.
- Dorans KS, Bazzano LA, Qi L et al. Effects of a Low-Carbohydrate Dietary Intervention on Hemoglobin A1c: A Randomized Clinical Trial. *JAMA Netw Open.* 2022 Oct 3;5(10):e2238645.
- Rasmussen L, Christensen ML, Poulsen CW et al. Effect of High Versus Low Carbohydrate Intake in the Morning on Glycemic Variability and Glycemic Control Measured by Continuous Blood Glucose Monitoring in Women with Gestational Diabetes Mellitus—A Randomized Crossover Study. *Nutrients.* 2020 Feb 13;12(2):475.

Results:

- A total of 121 adults; 53% women completed the trial.
- HbA1c was reduced (0.3%) after 12 wks. of a LC breakfast, but the between-group difference in HbA1c was of borderline statistical significance (0.2; P = 0.06).
- There were no significant differences between the LC and CTL groups for weight, BMI, or waist circumference.
- Mean and maximum glucose, area under the curve, glycemic variability, and time above range were all significantly lower, and time in range (see chart below) was significantly higher, in the LC group compared with CTL (all P < 0.05).
- The 2-h postprandial CGM data analyzed after breakfast showed that mean glucose was significantly lower in the LC group when compared with the CTL group (P < 0.01).
- Self-reported total daily energy (P = 0.03) and carbohydrate (P < 0.01) intake were lower in the LC group, but the significance of this difference is unclear.



Conclusion:

In adults with type 2 diabetes, consuming a low carbohydrate breakfast appears to be a simple dietary strategy that can be adhered to over 12 weeks, and results in better measures of glycemic control assessed by CGM when compared with a low-fat breakfast. Over time, HbA1c may decrease as well as a reduction in overall energy intake.