



Can viscous fiber lower glycemic markers in type 2 diabetes?

The first meta-analysis to focus on viscous dietary fiber in T2D suggests a potential role for this supplement in improving glycemic control.

PRACTICE CHANGER

Unless contraindicated, recommend viscous fiber supplementation to your patients with type 2 diabetes (T2D), in addition to the usual evidence-based standards of care, to improve markers of glycemic control.

STRENGTH OF RECOMMENDATION

C: Based on a meta-analysis and systematic review of 28 randomized controlled trials, without discussion of patient-oriented outcomes.¹

Jovanovski E, Khayyat R, Zurbau A, et al. Should viscous fiber supplements be considered in diabetes control? Results from a systematic review and meta-analysis of randomized controlled trials. *Diabetes Care*. 2019;42:755-766. Published correction appears in *Diabetes Care*. 2019;42:1604.

ILLUSTRATIVE CASE

A 57-year-old man who was given a diagnosis of T2D a year ago presents for an office visit. His hemoglobin A1C level at diagnosis was 8.3%. He is otherwise healthy and has been adhering well to a plan of metformin 1000 mg twice daily, regular exercise, and a low-carbohydrate diet you recommended. His most recent hemoglobin A1C is 7.3%. He is pleased with his progress, so he is discouraged when you tell him that he is not yet at goal. He asks if there are other things that he can do to further lower his hemoglobin A1C. What can you recommend for him?

According to the National Diabetes Statistics Report, 2020 from the Centers for Disease Control and Preven-

tion, approximately 34.1 million US adults ≥ 18 years of age (13% of the adult population) have diabetes, 50% of whom have a hemoglobin A1C $> 7\%$. The report also states that approximately 88 million US adults—more than one-third of the population—have prediabetes.²

The American Diabetes Association (ADA) estimated that diabetes-related health care costs in the United States for 2017 totaled \$237 billion, an increase of 26% from 2012. More than \$30 billion of this expense comes directly from diabetes medications; the remainder of these costs are related to lost wages, clinic visits, hospitalizations, and treatment for diabetic complications and comorbidities. After controlling for age and gender, medical expenditures for people with diabetes are 2.3 times higher than for those without diabetes.³

The 2019 ADA *Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report* makes general recommendations concerning fiber intake for patients with diabetes or prediabetes, stating that these patients should consume approximately 14 g of fiber for every 1000 kcal consumed, giving preference to whole-food sources rather than supplements.⁴ The report indicates that some studies have shown hemoglobin A1C reductions of 0.2% to 0.3% with daily fiber intake exceeding 50 g. However, this level of intake can cause unpleasant gastrointestinal adverse effects, including bloating, diarrhea, and flatulence.^{4,5}

CONTINUED

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As an adjunct to standard of care, viscous fiber supplements significantly improved hemoglobin A1C and other glycemic markers in patients with T2D.

STUDY SUMMARY

Effect on A1C exceeded the FDA threshold for new drugs

This systematic review and meta-analysis searched MEDLINE, Embase, and the Cochrane Central Register of Controlled Trials to identify randomized controlled trials that studied the effects of viscous fiber supplementation on glycemic control in patients with T2D. Eligible studies included those that: (1) had a duration ≥ 3 weeks; (2) allowed isolation of the viscous fiber effects; and (3) reported at least 1 of the following glycemic measures: hemoglobin A1C (n = 1148 patients), fasting glucose (n = 1394), fasting insulin (n = 228), homeostatic model assessment of insulin resistance (HOMA-IR; n = 652), and fructosamine (n = 23).

Data were pooled using the generic inverse variance method and expressed as mean difference (MD) with 95% confidence intervals (CIs). Heterogeneity was assessed and quantified (Cochran *Q* and *I*² statistics, respectively). *I*² $\geq 50\%$ indicates substantial heterogeneity. The Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach was used to evaluate the overall strength of evidence.

Twenty-eight eligible studies were compared. The median age of included patients was 60 years. The median dose of viscous fiber was 13.1 g/d (range, 2.55-21). Viscous fiber type varied between the studies and included psyllium, guar gum, β -glucan, and konjac, and was consumed in powder, tablet, capsule, and limited food-based forms (in 1 of the included studies). The median trial duration was 8 weeks, with 11 trials lasting ≥ 12 weeks.

The study found moderate-grade evidence that, when added to standard of care, viscous fiber supplementation reduced hemoglobin A1C (MD = -0.58%; 95% CI, -0.88 to -0.28; *P* = .0002; *I*² = 91%), fasting glucose (MD = -14.8 mg/dL; 95% CI, -23.8 to -5.58; *P* = .001; *I*² = 92%), and HOMA-IR (MD = -1.89; 95% CI, -3.45 to -0.33; *P* = .02; *I*² = 94%) compared with control. The effect on hemoglobin A1C exceeds the $\geq 0.3\%$ threshold established by the US Food and Drug Administration for new antihyperglycemic drug development. There was no

significant effect on fasting insulin or fructosamine, although the sample size for fructosamine was small. No significant evidence of a dose-dependent response effect was found. The studies had substantial heterogeneity. No evaluation of potential or real harm was noted in the analysis.

WHAT'S NEW

Potential glycemic benefit without large dietary increase

The glucose-lowering effects of increased fiber intake have often been hypothesized, but this meta-analysis is the first to focus specifically on the effect of viscous fiber supplements in patients with T2D. Prior meta-analyses, including those cited in the 2019 ADA recommendations mentioned above, included primarily whole-food dietary sources of fiber in the treatment arms and generally had more modest effects on outcomes.^{4,6,7}

By focusing on viscous fiber supplements, this study isolated the effect of these supplements vs fiber-rich dietary changes. It illustrates a greater potential benefit with supplements than whole-food dietary sources of fiber, and at a lower dose of fiber than was seen in prior studies without requiring substantial increases in caloric intake. Viscous fiber supplementation is a potential adjunct to the usual evidence-based standards of care for glycemic control in patients with T2D.

CAVEATS

Limited study durations may raise uncertainty about long-term benefits

This meta-analysis does have its limitations. The heterogeneity among the studies analyzed makes it difficult to establish a single recommendation regarding dose, type, and brand of fiber to be used. Only 11 of the 28 studies lasted longer than 12 weeks, with a median duration of 8 weeks, making any long-term effects on hemoglobin A1C unknown. No adverse effects or reactions were described to evaluate safety and tolerability of the viscous fiber supplementation. No patient-oriented outcomes were reported.

CHALLENGES TO IMPLEMENTATION

Patients may not be eager to supplement with viscous fiber

The biggest challenge to implementation is patient compliance. Some forms of supplemental fiber are less palatable than others and may cause unpleasant gastrointestinal adverse effects, which may be an impediment for some patients. Cost may also be an issue for some patients. Diabetes medications can be expensive; however, they are often covered, at least partially, by medical insurance. Over-the-counter supplements are unlikely to be covered for most patients. **JFP**

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