Discussion Summaries

Fiber Wars: Are mixed soluble and insoluble fibers the answer for irritable bowel syndrome?

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Abstract

Fiber is known to exert various favorable effects on the gastrointestinal tract via modulation of the microbiota, formation of metabolites (such as short chain fatty acids), altered motility, and manipulation of stool form. While there has been tremendous interest in utilizing fiber in the treatment of irritable bowel syndrome, results have been conflicting, with some studies finding benefit and others finding no effect or even worsening of symptoms. Nopal is a fiber derived from a cactus plant which is predominantly composed of soluble fiber.

We summarize the @GIJournal discussion held on April 21, 2021 during which Remes-Troche et al. "Nopal fiber (*Opuntia ficus-indica*) improves symptoms in irritable bowel syndrome in the short term: a randomized controlled trial" was critically reviewed by our expert Dr. Mark Pimentel (MP) and moderated by Dr. Linda Nguyen (LN).

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Introduction

Irritable bowel syndrome (IBS) is a heterogeneous disorder of gut-brain interaction whose pathophysiology may include alterations in the intestinal microbiota. Since fiber is known to exert various favorable effects on gastrointestinal function including via modulation of the microbiota, it is plausible that fiber could be useful in the treatment of IBS.¹ Many trials and systematic reviews have been conducted on fiber for IBS, but the results have been conflicting.^{2,3,7} These conflicting results may derive in part from the heterogeneity of fibers studied (e.g., soluble versus insoluble), the dose and duration of the interventions, and the subtype of IBS (i.e., IBS-D versus IBS-C versus IBS-M). Fiber is also associated with gas production (via fermentation by the microbiota) which can cause bloating, distension, and abdominal discomfort or pain. Soluble fiber is better tolerated, with less bloating. Nopal is a plant fiber derived from the *Opuntia ficus-indica* cactus native to Mexico, and which contains a mix of soluble and insoluble fibers. It has been shown to have prebiotic and stool forming effects.⁴

The recent article “Nopal fiber (*Opuntia ficus-indica*) improves symptoms in irritable bowel syndrome in the short term: a randomized controlled trial” was a 4-arm, double-blinded, parallel, randomized controlled trial designed to compare different doses of nopal fiber (10, 20, 30 g/day) with placebo (30 g/day dextrose mixed with natural green colorant) on IBS symptoms. The primary outcome was adequate relief of IBS symptoms. Secondary outcomes included IBS symptoms (measured by the irritable bowel syndrome symptom severity and the gastrointestinal symptom rating scale) and stool output (Bristol scale). Hydrogen and methane breath tests and fecal short chain fatty acids (SCFA) were also compared before and after the intervention.

Out of the 60 patients randomized, 40 (66%) met the primary endpoint of adequate relief. There was no difference by age, sex, or IBS subtype. The 20 g/d dose had the best results and tolerability. All doses improved abdominal pain, borborygmi, bloating, constipation, urgency, incomplete evacuation, and tiredness. There were no differences in breath hydrogen or methane, or in fecal SCFAs. The most commonly reported adverse effect was unpleasant taste of the nopal.

Limitations of the study included short duration of the study (7 days), lack of analysis of microbiome or gut transit times, inadequate blinding, and potential confounders from other dietary changes. The authors concluded that 20 g/d of nopal supplementation may be optimal for all types of IBS.

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Q1a. The 2020 ACG guidelines recommend soluble but not insoluble fiber for IBS. Nopal is a mixed soluble and insoluble fiber. Based on the acute effects of Nopal on GI symptoms, would you recommend to patients?

MP The ACG guidelines on IBS took the approach that the therapy had to make all IBS (global symptoms) better. Not just constipation or pain by itself. Fiber appeared to help constipation mostly but had the risk of bloating.

Q1b. Thoughts about dosing fiber all at once as done in this study vs divided throughout the day? Does it impact tolerance?

MP If I use fiber in my practice, I like to give it at bedtime so if there is bloating, it happens at night and does not interfere with the day. It's hard to function with bloating all day.

LN I usually have patients divide the dose of fiber throughout the day. Nighttime seems to be an option.

Q1c. When you recommend starting fiber, how do you account for dietary intake? Do you start low and titrate up or immediately recommend the 25-35 g/d today dose? What % should be soluble?

MP In my practice I see really tough patients who have been around the block with fiber. But, if I use it, I find it works best in the mild IBS-C patients. Regardless of the indication, I start low and titrate up. Where do you position it for best effect?

LN Like you, I tend to see patients with more severe symptoms. I only use fiber to "manipulate" stool form but only after another therapy has been started first i.e., prosecretory for IBS-C. I use Benefiber as it's tasteless. I typically tell patients to aim for 40-50% soluble fiber. Most patients are eating too much insoluble fiber when they say, "I have a high fiber diet."

JD I recommend ground flaxseed, which has both soluble and insoluble fibers!

@chemaremes I usually try to titrate from a low dose and try to start with non or low fermentable fiber. Nopal is something that naturally has a good combination, but we need to move for a long trial and compare it with Psyllium (currently we are finishing that trial).

@Gldietitian I recommend a gradual increase to help tolerance: 1-3 grams of fiber (approximately 1 serving of fruit or vegetables) added every 3 days. And when increasing fiber, remember to increase fluids as well.

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Q2. Would you expect to see changes in stool SCFAs after 1 week of fiber therapy?

MP I think the answer is yes. SCFA are produced by bacteria, and a number of microbiome projects show that the colonic microbiome can change even after a couple of days on a particular diet.

Q3. In this study, baseline fasting breath hydrogen and methane levels were used as a marker of fermentation. What are the pros/cons of using this test as a marker for tolerability?

MP This question is 3-D chess. Hydrogen has never correlated with bloating because hydrogen disposition pathways clear it toward making methane, hydrogen sulfide, or through acetogenesis. Therefore, the hydrogen you see on breath testing may not be the true amount produced. Methane may be more reliable because methane is proportional to methanogens. But if you have diarrhea from nopal, this could clear out methanogens.

Q4. How do you choose which fiber products to recommend? Do you have a list of favorites and why?

JD I recommend increasing fiber from diet (flaxseed is a favorite) before recommending something like psyllium, Benefiber, Metamucil, etc. It's tastier and better for you!

@Gldietitian Psyllium (non-fermentable fiber) is helpful in my experience. With respect to fiber from whole foods, people tend to have less gas, bloating, and reduced transit when limiting raw veggies, whole grains, nuts, and seeds.

@KateScarлата_RD Fiber is complicated- its impact on gut symptoms extends beyond solubility characteristics. How quickly it is fermented and whether it has gel-forming capacity plays a role too. Plus, foods often come packaged with a number of different fibers. That being said, from my clinical experience, insoluble fiber (found in skins of fruits and vegetables, wheat bran, also in nuts and seeds) can be more problematic in IBS. But remember FODMAPs can prompt GI symptoms, as they are soluble fibers, but short chain and rapidly fermentable.

Psyllium husk is a soluble fiber with low fermentability, gel-forming capacity, and is tolerated in many (not all) with IBS. It can help with diarrhea AND constipation.

@emilyhaller_rdn Soluble fiber is the way to go for those with severe IBS. Insoluble is likely to be more problematic. Food should be the first approach. Consider fiber characteristics when guiding patients toward fiber containing foods and supplements.

@nehagastrord Recommendations for fiber are so personalized. Many fibers are also a mix of different fibers, so amount plays a role as well. It is important to learn what the symptoms are first, and then try to match up the type and amount of fiber to what may help reduce symptoms.

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Q5. Does your recommendation for fiber differ in IBS patients with and without prior history of SIBO?

MP SIBO is a different situation. Surely some of these IBS patients had this. This would definitely worry me. I find that fiber can make SIBO much worse.

We now know that a good proportion of IBS is SIBO based on breath testing, culture and now even sequencing.⁶

One big problem here with so many studies including this one is that they include IBS-D, IBS-M and IBS-C as well as some with methane and some with hydrogen on breath test. So with 15 subjects per group, it's a mixed bag. I would like to see a study with just IBS-C.

JD Reminds me of the @gbsaff study⁵ which showed that it was not the presence of SIBO but small bowel dysbiosis that was associated with DGBI symptoms, and that a high fiber diet could cause SIBO on testing but without symptoms!

Q6. Given the safety of a product like Nopal, do you think a larger, long term efficacy study is needed before recommending use?

I know this group of investigators and they did an amazing job with this trial with a lot of moving parts (anyone who's done a blinded trial knows this). But this seems promising. It looks relatively safe, but before a serious recommendation, we need a larger trial.

Q7. The mean group IBS-SSS at baseline ranged from 228-254 which is considered moderate symptom severity. Do you think patients with severe symptoms would also benefit?

MP Hard to know. I really don't think it's wise to have severe IBS in these smaller clinical trials. For example, severe diarrhea IBS might not be IBS at all. I always say that if a patient has constant diarrhea, it's not typical of IBS.

LN Do you generally avoid or limit fiber in patients with severe IBS?

MP Truthfully, I avoid fiber in severe IBS. I just don't see that much success and maybe making things worse.

LN Same. I find many patients with IBS are taking too much fiber, which causes more symptoms. Patients with severe IBS symptoms generally require a multi-pronged approach. I do try to slowly add fiber when symptoms get better.

Q2. How do you think Nopal helps IBS symptoms? The benefit was seen across all IBS subtypes and all of the symptom domains captured in the IBS-SSS?

JD The authors suggested:
-increased stool volume

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- changes to microbiota
- anti-inflammatory effects mediated by metabolites (high in calcium, beta-carotene, and lutein)

And we have to also consider placebo response since blinding was suboptimal.

MP Herein lies the problem as we see with peppermint. We have shown that with peppermint, as the studies got larger in numbers of patients, the p value got worse and worse. I like this article and the treatment is easy and maybe inexpensive, but a larger study would go a long way.

@ijlalakbar This could be explained by the lack of blinding

Conclusion

Mixed soluble and insoluble fibers such as in nopal, psyllium, and many foods appear to be a promising intervention for IBS across subtypes. Fiber should be introduced at low doses with small increases as tolerated. Larger studies should be conducted with nopal 20 g/d to better characterize its utility in IBS.

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