



Review

Diet in Benign Colonic Disorders: A Narrative Review

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ABSTRACT

Purpose: Diet plays an important role in common benign colorectal diseases. This article reviews the evidence for diet and supplemental fiber in patients with chronic constipation, irritable bowel syndrome, inflammatory bowel disease, colonic diverticulitis, and fecal incontinence.

Methods: We performed a narrative review of the evidence for diet and supplemental fiber in patients with 5 common benign colonic diseases and summarized guideline recommendations for each condition. We generated tables of practical dietary advice by disease.

Findings: Diet advice must be individualized and depends on underlying conditions, disease severity, symptom burden, and nutrition status. Guidance from a registered dietitian is highly recommended when making any dietary changes. Data from trials suggest that soluble fiber is effective for patients with chronic constipation, irritable bowel syndrome, and fecal incontinence. A diet low in select fermentable, oligo-, di-, and monosaccharides, and polyols may benefit patients with irritable bowel syndrome. Patients with inflammatory bowel disease, especially those with active disease, are at risk for malnutrition. Dietary restrictions may further increase that risk. There is limited evidence to recommend increasing or avoiding select food groups in patients with inflammatory bowel disease. Patients who have recovered from diverticulitis should adopt a prudent dietary pattern high in fruits, vegetables, whole grains, legumes, poultry, and fish.

Implications: Clinicians should counsel patients on the contribution of diet to their colorectal condition and the benefits and harms of dietary modification. Dietary advice should be practical and accompanied by realistic expectations for benefit. (*Clin Ther.* 2022;44:657–670.) © 2022 Elsevier Inc.

Keywords: chronic constipation, colonic diverticulitis, diet, fecal incontinence, fiber, inflammatory bowel disease, irritable bowel syndrome.

INTRODUCTION

Diet plays a fundamental role in health and disease, particularly for disorders of the colon and rectum. There is an increasing body of evidence that supports the use of specific diets in the management of common benign colorectal diseases. Clinicians should counsel patients on the contribution of diet to their colorectal condition as well as the benefits and harms of dietary modification. Dietary advice should be practical and accompanied by realistic expectations for benefit. The purpose of this article is to review the highest-quality evidence for diet in patients with chronic constipation, irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), colonic diverticulitis, and fecal incontinence and generate practical advice for clinicians who manage these conditions.

METHODS

We performed a narrative review on diet and diet modification in patients with common benign colonic diseases. We focused on intake of whole foods, dietary patterns, and fiber supplements. Dietary supplements and probiotics were beyond the scope of this article. We limited our review to adult populations in Western countries with primary chronic constipation, IBS, IBD, colonic diverticulitis, and fecal incontinence. PubMed and Cochrane databases were searched using the terms *diet*, *dietary patterns*, *fiber*,

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constipation, irritable bowel syndrome, inflammatory bowel disease, diverticulitis, and fecal incontinence for articles published from 2010 to December 2021. References were also identified from systematic reviews and guidelines published during this time. We selected systematic reviews, meta-analyses, randomized controlled trials, and observational studies. Diet-specific guideline recommendations are summarized for each condition.

RESULTS AND DISCUSSION

Primary Chronic Constipation

Constipation is a common condition with a prevalence of 14% in community-dwelling adults.¹ Patients with primary chronic constipation experience difficult, unsatisfactory, or infrequent defecation. Dietary and lifestyle factors are the most common contributors to primary constipation. Slow colonic transit and rectal evacuation disorders are less common secondary causes. Patients with chronic constipation report decreased quality of life and greater work and activity impairment compared with the general population and frequently seek advice from their medical practitioners, resulting in 3.1 million ambulatory visits annually for constipation.^{2,3}

Evidence for Dietary Modification

In clinical practice, first-line treatment for primary chronic constipation is dietary modification with increased dietary or supplemental fiber intake. The evidence for this practice is limited. A high-fiber diet is associated with a reduced risk of constipation in some observational studies⁴⁻⁶ but not others.^{7,8}

Trials have tested the hypothesis that dietary or supplemental fiber is effective for treatment of constipation. In a systematic review of 4 trials that included 315 participants with chronic constipation, randomization to *soluble* fiber compared with placebo or no therapy led to improvement in global symptoms (87% vs 47%), straining (36% vs 79%), stool consistency, and mean number of stools per day (1.3 vs 0.9).⁹ Three of the trials used psyllium (total dose, 10 g/d). The fourth trial used a combination of inulin and maltodextrin (20 g/d). Treatment ranged from 2 to 8 weeks. In a systematic review of 2 trials that included 53 participants with chronic constipation, randomization to *insoluble* fiber compared with placebo or low-fiber bread had inconsistent results.⁹

Other studies have evaluated the role of fruit-derived fiber in the treatment of constipation. There is limited evidence to suggest that prunes may be effective for treating constipation. Prunes contain the fermentable carbohydrate sorbitol. A trial of 40 patients with chronic constipation randomized patients to 8 weeks of prunes (50 g twice a day) or psyllium (11 g twice a day).¹⁰ Compared with baseline, treatment with prunes and psyllium resulted in a significant improvement in the number of complete spontaneous bowel movements per week (prunes: 1.8 vs 3.5; psyllium: 1.6 vs 2.8). Randomization to prunes was associated with greater improvement in the number of complete spontaneous bowel movements per week, stool consistency, and overall constipation symptoms compared with psyllium.

Kiwifruit may also be effective for constipation. A trial of 75 patients with chronic constipation randomized patients to 4 weeks of green kiwifruit (2 per day), prunes (100 g/d), or psyllium (12 g/d).¹¹ The primary end point was the proportion of participants reporting an increase of ≥ 1 complete spontaneous bowel movements per week compared with the baseline. For the primary end point, 45% in the kiwifruit group were responders compared with 67% in the prunes group and 64% for the psyllium group. Bowel movement frequency rates, straining, and stool consistency improved in all 3 groups. The psyllium group (68%) was most likely to report any adverse event (abdominal pain or discomfort, bloating, or gas) compared with the prune (45%) or kiwifruit (32%) group. Despite the primary end point results, patients randomized to kiwifruit (68%) were most likely to be satisfied with treatment compared with patients randomized to prunes (48%) or psyllium (48%). Another trial randomized 32 patients with mild chronic constipation or IBS with constipation to 4 weeks of 3 gold-fleshed kiwifruits or psyllium (14.75 g/d).¹² Kiwifruit resulted in a significant improvement in bowel movement frequency and gastrointestinal discomfort compared with psyllium.

There is something to be learned about the management of constipation from individuals who consume vegetarian and vegan diets. These groups have more frequent bowel movements compared with those who consume a meat- or fish-based diet.¹³ In a cross-sectional study of 20,630 men and women 22 to 97 years of age, mean adjusted bowel movement frequency per week was higher in vegetarians (men: 10.5; women:

9.1) and vegans (men: 11.6; women: 10.5) compared participants who ate meat (men: 9.5; women: 8.2) or fish (men: 9.8; women: 8.7). In the same study, increasing intake of dietary fiber was associated with an increase in the mean number of bowel movements per week.

Guideline Recommendations

Guideline recommendations for dietary modification or fiber supplementation in patients with chronic constipation are limited and nonspecific. A guideline published by the American Gastroenterological Association in 2012 recommended a trial of fiber supplementation as initial treatment.¹⁴ The quality of evidence for this recommendation was graded as very low. The technical review that accompanied the guideline noted that fiber supplementation could be considered as a fiber supplement (ie, 1 tsp up to 3 times daily of methylcellulose or 2–4 tablets once daily of calcium polycarbophil) or through dietary changes.¹⁵ Specific dietary recommendations were not made. A guideline published by the European Society of Neurogastroenterology and Motility in 2020 states that patients with constipation should initially be managed with lifestyle and dietary modifications, withdrawal of constipating medications, and fiber supplementation.¹⁶ The authors recommend bulking agents, in particular soluble fiber for management of chronic constipation. Insoluble fibers were not recommended because of the risk of bloating, distension, flatulence, and cramping.

Summary

Patients presenting with constipation require a focused history and physical examination, including a rectal examination. Secondary causes of constipation must be considered and ruled out if appropriate. A trial of dietary modification is a reasonable first-line therapy in patients with primary, chronic constipation. Patients should be instructed to gradually increase their soluble fiber intake with a supplement or dietary modification to prevent bloating and abdominal cramps. Patients should be counseled that it may be days to weeks before they notice an improvement. For tolerable and appropriate dietary modification, referral to a registered dietitian experienced in gastrointestinal disorders is often helpful to patients. A summary of practical dietary advice for patients with chronic constipation is detailed in [Table I](#). If patients fail to improve, clinicians should offer patients an over-

the-counter or prescription treatment options for constipation while encouraging patients to continue to eat a healthy, balanced high-fiber diet.

Irritable Bowel Syndrome

IBS is a common functional bowel disorder characterized by recurrent abdominal pain with associated changes in stool patterns, frequency, and/or form. On the basis of the dominant stool form or consistency, the condition is subcategorized as IBS with constipation, IBS with diarrhea, mixed IBS, and unspecified IBS. The prevalence of IBS is 11%, and the condition is a significant detriment to quality of life.^{17,18} The management of IBS involves a stepwise approach beginning with a confident diagnosis, education, and dietary modification if needed.¹⁹

Evidence for Dietary Modification

Fiber supplementation has been the first-line treatment for IBS for decades.²⁰ A systematic review published in 2014 included 14 trials of fiber supplementation compared with control in 906 patients with IBS.²¹ Soluble and insoluble fiber had different effects on IBS symptoms. Treatment with soluble fibers had a significant improvement (relative risk, 0.83; 95% CI, 0.73–0.94) in IBS symptoms. Insoluble fibers did not improve or made symptoms worse compared with placebo. The review concluded that soluble supplemental fiber is effective in treating patients with IBS.

A low fermentable oligosaccharides, disaccharides, monosaccharides, and polyols (FODMAPs) diet is another dietary approach to treating patients with IBS. FODMAP is a collective term for carbohydrates that are poorly absorbed in the small intestine. On reaching the colon, these sugars are fermented by colonic bacteria, causing excessive gas production. The FODMAPs are also osmotically active and draw more fluid into the colon. By these 2 mechanisms, FODMAPs are thought to contribute to bloating, abdominal pain, and flatulence in patients with IBS.

Clinically, the low-FODMAPs diet involves food elimination and reintroduction phases. In a systematic review and meta-analysis of 7 trials and 397 patients, a low-FODMAPs diet was associated with a reduced burden of IBS symptoms compared with controls (risk ratio, 0.69; 95% CI, 0.54–0.88).²² The quality of the data was assessed to be very low. Studies on the low-FODMAPs diet for IBS frequently involve

Table I. Practical dietary advice for patients with primary, chronic constipation.

- A trial of dietary modification is reasonable first-line therapy with a supplement such as psyllium (6 g dissolved in water twice per day) or dietary modification such as 2 whole, peeled kiwifruits per day or 6 prunes twice per day.
- The recommend daily intake of dietary fiber is 25 g for women and 38 g for men. Patients should gradually increase their soluble fiber intake to prevent bloating and abdominal cramps.
- The benefits of increased dietary fiber or fiber supplementation may take weeks and not days.
- Insoluble fibers are not recommended because of the risk of bloating, distension, flatulence, and cramping.
- If patients fail to improve with fiber therapy, clinicians should discuss with patients over-the-counter laxatives and/or prescription treatment options while encouraging patients to continue to eat a healthy, balanced, high-fiber diet.

the input or guidance of experienced dietitians. Unguided or otherwise non-dietician-guided strategies have not been adequately studied and pose a risk for inappropriate or intolerable implementation of the diet.²³

Lactose and gluten are frequently reported triggers in patients with IBS. Lactose is the carbohydrate in mammalian milk and functions like FODMAPs in most adults. Lactose intolerance can be considered in patients with suspected IBS with a compelling history and symptomatic improvement with a trial of a lactose-free diet. Gluten is a structural protein found in some grains, such as wheat, barley, and rye. In a systematic review and meta-analysis of 2 trials with 111 patients, a gluten-free diet was not associated with a statistically significant improvement in IBS symptoms compared with controls (risk ratio, 0.42; 95% CI, 0.11–1.55).²² There is currently insufficient evidence to recommend a gluten-free diet to patients with IBS.

Guideline Recommendations

Diet is rarely adequately addressed in guidelines on the management of IBS. The 2020 American College of Gastroenterology guideline suggests that soluble but not insoluble fiber be used to treat patients with IBS to improve symptoms.²⁴ This suggestion is a strong recommendation based on moderate quality of evidence. The guideline does not distinguish between dietary and supplemental fibers. The guideline also suggests a trial of a low-FODMAPs diet in patients with IBS to improve symptoms. Again, this is a conditional recommendation based on very low quality

of evidence. The 2014 American Gastroenterology Association guideline on IBS management does not address diet.²⁵

In contrast with the American guidelines, the National Institute for Health Care Excellence published an IBS guideline in 2015 with multiple diet recommendations.²⁶ The guideline includes detailed general dietary advice, some of which is included in [Table II](#). The authors recommend single food avoidance and exclusion diets (eg, the low-FODMAPs diet) if patients do not improve with the proposed general dietary advice. The guideline specifically recommends that trials of food avoidance are only appropriate with supervision from a health care professional with expertise in dietary management.

Summary

IBS should be managed in a stepwise manner that begins with a confident diagnosis and education.¹⁹ A thorough history and physical examination should be performed with a focus on identifying the predominant symptom. IBS is not a diagnosis of exclusion; however, alarm symptoms, such as weight loss, gastrointestinal bleeding, fever, symptom onset after 50 years of age, and diarrhea-predominant symptoms, warrant further workup.²⁶ Clinicians should be aware that disordered eating is common in patients with gastrointestinal diseases, particularly disorders of the gut-brain interaction (ie, IBS) and should assess for disordered eating when appropriate.^{27,28} A summary of practical dietary advice for patients with IBS is detailed in [Table II](#). Patients with IBS should be counseled that that IBS is a heterogeneous

Table II. Practical dietary advice for patients with irritable bowel syndrome.

- Initial dietary advice based on the National Institute for Health Care Excellence irritable bowel syndrome guideline:
 - Consume regular meals, take time to eat, do not skip meals
 - Drink at least 8 cups of fluid a day (water or caffeine-free drinks)
 - Drink <3 cups of caffeinated tea and coffee per day
 - Avoid or reduce intake of alcohol and carbonated drinks
 - Reduce consumption of starches that resist digestion in the small intestine, which includes foods that are processed
 - Limit fresh fruit to 3 portions a day
 - Avoid sorbitol, a common artificial sweetener found in processed foods, candy, and drinks
 - Consider a trial of increasing *soluble* dietary fiber intake in the form of oats or a fiber supplement such as psyllium, gradually increase intake to prevent bloating and abdominal cramps
 - Limit intake of foods high in *insoluble* fibers, such as bran
- If symptoms do not improve with the general dietary advice detailed above, consider a trial of the low-FODMAPs diet. The FODMAPs diet approach requires consultation and follow-up with an experienced dietitian.
- There is insufficient evidence to recommend a gluten-free diet to patients with irritable bowel syndrome.

FODMAPs = fermentable oligosaccharides, disaccharides, monosaccharides, and polyols.

disorder and some patients will benefit from dietary modification whereas others will not. Trials of food avoidance are only appropriate with supervision from a health care professional with expertise in dietary management. The low-FODMAPs diet is not intended for long-term use but only to identify those foods that are associated with gastrointestinal symptoms. The goal of the low-FODMAPs diet is to identify which foods, if any, trigger symptoms and if avoidance improves those symptoms. In the final stage of the diet, only FODMAPs that cause symptoms are avoided. If patients fail to improve with dietary modification or are not interested in this approach, clinicians should take advantage of the many treatment options currently available for IBS.¹⁹

Inflammatory Bowel Disease

IBD is a common, chronic disease characterized by chronic inflammation of the gastrointestinal tract. The prevalence of IBD is 0.3% to 0.5% of persons in North America.²⁹ It is composed of 2 major subtypes: Crohn's disease and ulcerative colitis. Intestinal inflammation in ulcerative colitis is limited to the colon, whereas Crohn's disease can result in disease anywhere along

the gastrointestinal tract, although 60% of patients with Crohn's disease are estimated to have colonic involvement. Although a comprehensive understanding of the pathophysiology in IBD remains elusive, alterations in the microbiome, impairment of the intestinal barrier, and defects in host immunity have all been implicated.³⁰ The clinical course of IBD is marked by periods of active disease and remission in both subtypes. Therapeutic approaches include pharmacotherapy and surgical management. Nutrition is an important part of the management of IBD because these patients, especially those with active disease, are at an increased risk of malnutrition.

Evidence for Dietary Modification

A Western diet is associated with the development of IBD and is characterized by a diet high in meat, fat, wheat, dairy, sugar, and food additives and low in fiber. A prospective study conducted in the Netherlands collected diet- and health-related questionnaires from 125,445 individuals and found associations between certain dietary patterns and IBD.³¹ A Western pattern diet, high in snacks, prepared meals, and nonalcoholic beverages and low in fruits and vegetables was

associated with the development of Crohn disease (odds ratio [OR] = 1.16; 95% CI, 1.03–1.30). A diet high in red meat, poultry, and processed meat was associated with an increased risk of ulcerative colitis (OR = 1.11; 95% CI, 1.01–1.20). Multiple prospective cohort studies have reported similar patterns.^{32–34}

It is unknown whether the dietary factors associated with IBD development also play a role in disease activity. Prospective cohort studies investigating diet- and disease-related outcomes in patients with a known diagnosis of IBD are limited, and the results are conflicting. For example, a large prospective cohort study examining the nutrition intake of 191 patients with ulcerative colitis found that diets high in meat (OR = 3.2; 95% CI, 1.3–7.8) and alcohol (OR = 2.71; 95% CI, 1.1–6.67) were associated with an increased risk of relapse.³⁵ In contrast, a prospective, multicenter, observational study of 412 patients with ulcerative colitis did not find an association between dietary intake of processed meat or alcohol and disease activity.³⁶ Dietary intake of fatty acids, specifically myristic acid, was associated with an increased risk of relapse (OR = 3.01; 95% CI, 1.17–7.74). Similarly, observational studies in patients with Crohn disease have found no consistent association between dietary components of the Western diet and disease activity.^{37–39}

Randomized controlled trials have compared the effects of dietary manipulation with usual diet in patients with IBD. Trials published through 2019 were reviewed in a Cochrane Library Systematic Review.⁴⁰ The review included 18 trials with 1878 participants with ulcerative colitis or Crohn's disease. The trials assessed the following diets: (1) low refined carbohydrate, (2) low microparticle, (3) low calcium, (4) low red, processed meat, (5) low disaccharides, grains, saturated fats, red and processed meat, (6) symptom guided, (7) organic, (8) milk free, (9) the Alberta-based anti-inflammatory, and (10) Carrageenan free. After careful review, all the included studies were determined to be poorly designed, and the overall quality of the evidence was very low. The Cochrane review authors concluded that the effects of dietary interventions are uncertain.

A recent pilot trial suggests that the Crohn's disease exclusion diet, with or without partial enteral nutrition, is effective for inducing and maintaining remission in adults with mild to moderate Crohn's disease.⁴¹ The Crohn's disease exclusion diet is low in animal fat, gluten, dairy products, and emulsifiers, high in protein,

and moderate in soluble fiber. In the randomized trial, 40 adult participants with active Crohn's disease underwent monotherapy with the Crohn's disease exclusion diet or the Crohn's disease exclusion diet plus partial enteral nutrition. No significant differences between groups were seen at any timepoint. At week 6, 63% were in clinical symptomatic remission, and at week 24, 35% achieved endoscopic remission. Larger trials are needed to confirm these findings and compare the diet's effectiveness with that of traditional therapy.

The specific carbohydrate diet is another exclusion-based diet that is being studied in patients with IBD. This diet is primarily focused on the exclusion of complex carbohydrates and processed foods. Data from small studies suggest that the specific carbohydrate diet may help induce remission in children with Crohn disease.^{42,43} However, a recent randomized controlled trial of 191 adult patients with mild to moderate Crohn disease found that the specific carbohydrate diet was not superior to the Mediterranean diet in achieving symptomatic remission, and few patients in either group had improvement in markers of inflammation.⁴⁴ The authors concluded that the Mediterranean diet is preferred to the specific carbohydrate diet for patients with mild to moderate Crohn disease.

Very low-quality evidence suggests that therapy with exclusive enteral nutrition with an elemental, semielemental, or polymeric formula compared with corticosteroids is effective for induction of remission in children with active Crohn's disease.⁴⁵ There is no evidence of similar benefit in adults with active Crohn's disease. A recent proof-of-concept trial found that a whole foods diet that replicates exclusive enteral nutrition is potentially effective in adults with active Crohn's disease.⁴⁶ Although this trial is intriguing, further research is needed to assess the effects of a whole foods diet on disease outcomes.

Guideline Recommendations

Guideline recommendations for dietary modifications in IBD are often absent or nonspecific. A guideline published in 2018 by the American College of Gastroenterology states that dietary manipulation is acceptable for patients with low-risk, mild to moderate Crohn disease in the setting of careful observation (strong recommendation, very low level of evidence).⁴⁷ In the discussion, the authors clarify that dietary modification may be considered as an adjunct to other therapies in the induction phase and that patients at

low risk for disease progression may be treated with nonspecific therapies (presumably diet modification) directed at symptoms. Diet is not addressed in the 2019 American College of Gastroenterology on management of mild to moderate ulcerative colitis.⁴⁸ Guidelines published by the American Gastroenterological Association provide no dietary recommendations for the management of ulcerative colitis or Crohn disease.^{49,50}

The International Organization for the Study of IBD published dietary recommendations in 2020 based on expert opinion.⁵¹ Although not a guideline, this document included rationale for every recommendation. Recommendations were graded by the level of evidence (EL) and percentage of expert agreement. Recommendations are provided for food groups not specific diets. Most of these recommendations were based on low- or very low-quality evidence. Recommendations for Crohn's disease included increasing intake of fruits (EL, very low; expert agreement, 100%) and vegetables (EL, very low; expert agreement, 100%), and reducing the intake of saturated fats (EL, very low; expert agreement, 100%). For ulcerative colitis, recommendations included reducing intake of red and processed meat (EL, low; expert agreement, 100%) and myristic acid (EL, low; expert agreement, 100%) and increasing dietary consumption of ω 3 fatty acids (EL, low; expert agreement, 100%) but not dietary supplements (EL, high; expert agreement, 100%). Advice common for ulcerative colitis and Crohn's disease included avoiding unpasteurized dairy products (100%) and trans-fat (EL, very low; expert agreement, 100%). They also advised limiting consumption of food additives, such as maltodextrins and artificial sweeteners, emulsifiers and thickeners, carrageenan, and titanium dioxide and other nanoparticles (EL, very low; expert agreement, 92.3%). No recommendations could be made for refined sugars, carbohydrates, wheat or gluten, poultry, pasteurized dairy, or alcohol because of insufficient data or lack of consensus.

Summary

Patients with IBD, especially those with active disease, are at risk of malnutrition. Dietary restrictions, especially if not evidence based, may further increase that risk. Consultation with a registered dietitian is strongly recommended for a nutrition assessment at diagnosis and for routine follow-up. Clinicians, dietitians, and patients should collaborate on care to determine each patient's individual nutrition goals

to prevent or correct malnutrition. For patients with mild to moderate IBD, a personalized trial of dietary modification under clinical supervision may be a reasonable adjunct to traditional medical therapy. A summary of practical dietary advice for patients with IBD is detailed in [Table III](#). Patients receiving medical therapy for IBD should not stop taking their medications during the trial, and close follow-up to assess disease activity is strongly recommended.

Colonic Diverticulitis

Colonic diverticulitis is a common disease in adults that presents with acute-onset, often severe, abdominal pain.³ The incidence of diverticulitis in the United States is 209 cases per 100,000 person-years.⁵² The presentation and course of diverticulitis are variable.⁵³ The most common presentation is acute uncomplicated diverticulitis, defined as focal diverticular inflammation without abscess or perforation.⁵² Most cases resolve by 14 days; however, some inflammation persists for weeks or months and is classified as smoldering or chronic diverticulitis. A less common but more life-threatening presentation is complicated diverticulitis, defined as diverticular inflammation with obstruction, abscess, and/or perforation. Computed tomography is often necessary to make a diagnosis of diverticulitis in patients without prior imaging-confirmed diverticulitis and to rule out complications in patients with severe presentations.⁵⁴ Management of diverticulitis, including dietary recommendations, depends on disease severity, symptom burden, and clinical course. It is important to distinguish colonic diverticulitis from diverticulosis. Diverticulitis is inflammation in and around a diverticulum. Colonic diverticula are pockets that form in the colon wall when the mucosa and submucosa prolapse through the muscle wall. More than 70% of adults >80 years of age have diverticulosis on colonoscopy.⁵⁵

Evidence for Dietary Restrictions in the Acute Phase

Patients with acute uncomplicated diverticulitis are most often managed in the outpatient setting. In the acute phase, patients are often advised to adhere to a clear- or full-liquids diet, and as they recover, their diet is liberalized. This historic recommendation was thought to expedite recovery from the acute episode, reduce the risk of progressing to complicated diverticulitis, and improve symptoms. Preliminary

Table III. Practical dietary advice for patients with inflammatory bowel disease.

- Patients with inflammatory bowel disease, especially those with active disease, are at increased risk of malnutrition. Unnecessary dietary restrictions may further increase that risk. Consultation with a registered dietitian is strongly recommended for a nutrition assessment at diagnosis and for routine follow-up.
- There is insufficient evidence to advise for or against specific diets.
- For patients with mild to moderate inflammatory bowel disease, a trial of dietary modification using the International Organization for the Study of Inflammatory Bowel Disease 2020 dietary advice may be a reasonable adjunct to traditional medical therapy:
 - Patients with Crohn's disease should be encouraged to increase intake of fruits and vegetables, while decreasing consumption of saturated and trans fats, emulsifiers, carrageenans, artificial sweeteners, maltodextrins, and titanium dioxide.
 - Patients with ulcerative colitis should be encouraged to increase intake of ω 3 oils from fish and food, while decreasing foods that contain red meat, processed meats, dairy fat, palm and coconut oil, saturated and trans fats, emulsifiers, carrageenans, artificial sweeteners, maltodextrins, and titanium dioxide.
 - No recommendations can be made for refined sugars, carbohydrates, wheat or gluten, poultry, pasteurized dairy, or alcohol because of insufficient data.
- Patients with inflammatory bowel disease should avoid consuming unpasteurized dairy products.

studies, however, have not found diet restriction to be beneficial for treating patients with acute uncomplicated diverticulitis.⁵⁶ Dietary restriction may be beneficial only for the small proportion of patients who have a degree of colonic obstruction secondary to diverticular inflammation.

On the contrary, diverticulitis complicated by an obstruction, abscess, or perforation is managed in the hospital. Most patients are kept on nothing by mouth status in anticipation of possible procedure or managed with nasogastric decompression. If no procedures are anticipated, they follow a similar diet to those with uncomplicated diverticulitis.

Evidence for Dietary Modification for Prevention of Recurrence

Diet contributes to an estimated 25% of diverticulitis risk.⁵⁷ In addition to dietary factors, obesity, physical inactivity, nonsteroidal anti-inflammatory drugs, and smoking are also associated with an increased risk of diverticulitis.^{57–60} A recent population-based study also determined that genetic factors contribute to 40% to 50% of diverticulitis risk.⁶¹

A prudent dietary pattern decreases the risk of incident diverticulitis.⁶² A prudent diet is defined as a diet high in fruits, vegetables, whole grains, legumes, poultry, and fish. In a prospective cohort study of men,

1063 incident cases of diverticulitis were identified during 894,468 person-years of follow-up. Men in the highest quintile of prudent diet pattern intake had a reduced risk of incident diverticulitis compared with men in the lowest quintile of intake (hazard ratio [HR] = 0.74; 95% CI, 0.60–0.91). In the same study, a Western-style diet increased diverticulitis risk (HR = 1.55; 95% CI, 1.20–1.99). A Western diet was defined as a diet high in red and processed meats, refined grains, sweets, French fries, and high-fat dairy products. This study and similar observational studies have found that a diet high in red meat and low in fiber are the most important dietary contributors to diverticulitis risk.^{57,62,63}

There are no trials of dietary modification or fiber supplementation in patients with a history of diverticulitis. Although a low-fiber diet has been associated with an increased risk of diverticulitis, constipation is unlikely to be the mediating factor. A prospective cohort study found that more frequent bowel movements were associated with an increased risk of diverticulitis.⁶⁴ Clinicians should not assume that patients with diverticulitis experience chronic constipation.

Historically, diverticulitis was attributed to mechanical trauma in a diverticulum. Clinicians advised patients with a history of diverticulitis to avoid nuts,

seeds, popcorn, and corn to reduce the risk of recurrence. The belief that small, particulate matter precipitated episodes of diverticulitis was discredited by a large prospective cohort study that involved 801 incident cases of diverticulitis.⁵⁸ After adjustment for confounding, men with the highest intake of nuts and popcorn had a reduced risk of diverticulitis compared with men with the lowest intake (nuts: HR = 0.80; 95% CI, 0.63–1.01; popcorn: HR = 0.72; 95% CI, 0.56–0.92). Patients with diverticulosis or a history of diverticulitis do not need to avoid nuts, seeds, popcorn, and corn.

Guideline Recommendations

Few guidelines address diet in the acute phase of diverticulitis. The European Society of Coloproctology stated in 2020 that there was no evidence to support dietary restrictions. The guideline authors recommended a normal diet without restrictions in the acute stages of diverticulitis.⁶⁵ With regard to prevention of recurrence, the authors of the 2015 guideline from the American Gastroenterological Association suggest a fiber-rich diet or fiber supplementation.^{66,67} The authors also do not recommend avoidance of nut or popcorn. These were conditional recommendations based on very low-quality evidence. A 2020 guideline from the American Society of Colon and Rectal Surgeons made a strong recommendation to reduce meat intake based on low-quality evidence.⁶⁸ In contrast to the American guidelines, the European Society of Coloproctology found little evidence that a high-fiber diet can prevent recurrent episodes of diverticulitis or persistent symptoms.⁶⁵

Summary

After a first episode of diverticulitis, 25% of patients will experience recurrence. Patients commonly seek dietary advice to reduce this risk. Patients should be counseled that diet is one of many risk factors for recurrence and contributes to approximately 25% of their total risk. Patients who have recovered from an episode of diverticulitis should be encouraged to consume a prudent diet high in fruits, vegetables, whole grains, legumes, poultry, and fish and should minimize intake of red and processed meats, refined grains, sweets, French fries, and high-fat dairy products. There is no evidence that fiber supplements benefit patients with a history of diverticulitis. A summary of practical dietary advice for patients with diverticulitis is detailed in [Table IV](#). Patients with diverticulosis do not

necessarily need to follow this advice because colonic diverticulosis is so common and the relative risk of progressing to diverticulitis is low.⁶⁹

Fecal Incontinence

One in 13 community-dwelling adults in the United States has fecal incontinence.⁷⁰ Fecal incontinence is a disabling condition characterized by unintentional loss of stool. Several conditions are associated with the development of fecal incontinence, including anal sphincter dysfunction (obstetric trauma), pelvic floor dysfunction (rectal prolapse), bowel disturbances (constipation with overflow), inflammatory conditions (IBD), and nervous system disorders (multiple sclerosis). Episodes of incontinence are unpredictable and associated with shame and embarrassment. Patients rarely disclose symptoms of fecal incontinence because of the stigma of this condition.⁷¹ Clinicians must ask patients directly if they experience fecal incontinence, particularly in those patients with nonspecific lower gastrointestinal concerns and in patients with chronic bowel and anorectal diseases. Fecal incontinence is treatable, and most patients report an improvement in fecal incontinence with conservative management.

Evidence for Dietary Modification

Dietary or supplemental fiber can be an effective treatment for fecal incontinence. Fecal incontinence is exacerbated by loose or liquid stool, and select fibers can normalize stool consistency. Select fibers absorb fluid and increase stool bulk. Compared with loose or liquid stool, bulkier stool is easier for patients to sense, which reduces urgency and leads to more complete evacuation.

A high-fiber diet protects women from developing fecal incontinence compared with a low-fiber diet. A large prospective cohort study documented 7056 incident cases of fecal incontinence among 58,330 women during 193,655 person-years of follow-up.⁷² After adjustment for confounding, women who consumed a median of 24.4 g/d of dietary fiber had a reduced risk of fecal incontinence (HR = 0.82; 95% CI, 0.76–0.89) compared with women who consumed a median of 13.5 g/d. The benefit was only for women with fecal incontinence of liquid stool not solid stool. All dietary sources of fiber were protective. Men were not included in the study.

Trials have tested the hypothesis that supplemental fiber is effective treatment for fecal incontinence. A

Table IV. Practical dietary advice for patients with a history of diverticulitis.

- Multiple factors contribute to diverticulitis risk, including diet, obesity, physical inactivity, smoking, nonsteroidal anti-inflammatory drug use, and genes.
- Patients who have recovered from an episode of diverticulitis should consume a prudent diet high in fruits, vegetables, whole grains, legumes, poultry, and fish to reduce the risk of recurrence.
- Patients who have recovered from an episode of diverticulitis should minimize intake of red and processed meats, refined grains, sweets, French fries, and high-fat dairy products.
- Nut, corn, popcorn, and seed consumption is not associated with an increased risk of developing diverticulitis. Patients should not avoid these foods.
- There is no evidence to recommend fiber supplements in patients with diverticulitis.

placebo-controlled, single-blind randomized clinical trial compared 3 fibers (carboxymethylcellulose, gum arabic, and psyllium) with placebo for 32 days in 189 community-dwelling adults with fecal incontinence. The mean doses were 16.2 g/d of carboxymethylcellulose, 16.6 g/d of gum arabic, and 14.6 g/d of psyllium. Compared with placebo, the group randomized to psyllium had a significant improvement in fecal incontinence frequency and severity. Psyllium supplementation reduced fecal incontinence from 5.0 to 2.5 episodes per week. Carboxymethylcellulose increased the frequency of fecal incontinence, and there was no improvement in the group randomized to gum arabic. The trial included laboratory analysis of feces by group. Participants randomized to psyllium had a significant increase in the water content of feces and fecal gel formation during the supplement period. Although psyllium was generally well tolerated, abdominal cramping was more likely in the psyllium group compared with the placebo group (OR = 1.7; 95% CI, 1.0–2.7).

A randomized, double-blind, placebo-controlled trial compared psyllium powder with loperamide for 4 weeks in 80 community-dwelling adults with fecal incontinence.⁷³ The starting dose of psyllium was 3.4 mg/d and loperamide was 2.0 mg/d. Both groups had significant improvement in episodes of fecal incontinence with no difference in effectiveness between groups. Psyllium supplementation reduced fecal incontinence from 7.3 to 4.8 episodes per week. Constipation and headache were more likely with loperamide compared with psyllium.

A diet low in FODMAPs may be another useful tool for managing fecal incontinence.⁷⁴ Short-chain carbo-

hydrates are osmotically active and rapidly fermented, leading to increased water secretion and gas production within the gut lumen. Preliminary data suggest that dietary reduction of these carbohydrates may improve fecal incontinence. A retrospective case series of 65 patients with fecal incontinence with loose stools reported that 64.6% of patients who adopted a low-FODMAPs diet for at least 4 weeks had an improvement in symptoms. Of these patients, more than one-third had a complete response with no further episodes of fecal incontinence while on the FODMAPs diet.

Guideline Recommendations

Guideline recommendations for fiber supplementation and dietary modification in patients with fecal incontinence are limited and nonspecific. A guideline from the American College of Gastroenterology published in 2021 recommends use of drugs, such as loperamide or diphenoxylate, for diarrhea-predominant fecal incontinence and fiber supplements and/or laxatives for constipation-predominant fecal incontinence.⁷⁵ The type and dose of supplemental fiber were not specified. The guideline also suggests that foods that contain incompletely digested sugars and caffeine may contribute to loose stool and urgency.

Summary

Before considering treatment options, patients with fecal incontinence require a thorough history and physical examination, paying particular attention to the frequency of bowel movements, amount of stool passed, type of leakage, and presence or absence of urgency. Secondary causes of loose or watery stools much be treated, for example, microscopic colitis,

Table V. Practical dietary advice for patients with fecal incontinence.

- Patients should be advised to take an over-the-counter psyllium supplement daily for 4 weeks. The psyllium supplement should be titrated to effect. Psyllium may cause abdominal cramping, but this adverse effect commonly improves after a few weeks.
- There is insufficient evidence to recommend a high-fiber diet alone for treatment of fecal incontinence.
- A food and symptom diary may be helpful for identifying foods that trigger loose stools, diarrhea, or more frequent episodes of fecal incontinence. Common triggers include foods that contain incompletely digested sugars and caffeine.
- Patients may consider a trial of a low-FODMAPs diet with an understanding that the evidence of benefit is very limited. The FODMAPs diet approach requires consultation and follow-up with an experienced dietitian.
- If patients with fecal incontinence do not improve with trials of dietary modification and/or fiber supplementation, practitioners should pursue trials of antidiarrheal medications or pelvic floor rehabilitation and potentially consult with a surgeon who has expertise in procedures for fecal incontinence.

FODMAPs = fermentable oligosaccharides, disaccharides, monosaccharides, and polyols.

celiac disease, IBD, constipation with overflow, and fecal impaction. Fecal incontinence may improve with dietary modification and/or fiber supplementation, specifically over-the-counter psyllium supplement. Patients should start with the lowest dose of psyllium and up-titrate to effect for a 4-week trial. Patients should keep a food and symptom diary to identify foods and drinks that trigger loose stools, diarrhea, or more frequent episodes of fecal incontinence. Common triggers include foods that contain incompletely digested sugars and caffeine. A summary of practical dietary advice for patients with fecal incontinence is detailed in [Table V](#). If patients with fecal incontinence do not improve with trials of dietary modification and/or fiber supplementation, practitioners should pursue trials of antidiarrheal medications or pelvic floor rehabilitation and potentially consult with a surgeon who has expertise in surgical procedures for fecal incontinence.

CONCLUSION

This review article summarizes the evidence for dietary modification in the management of chronic constipation, IBS, IBD, colonic diverticulitis, and fecal incontinence. Patients should be educated about the complex contribution of diet to their disease and understand that diet modification alone is often not a cure. Clinicians should set reasonable expectations and be aware that disordered eating is common

in adult patients with gastrointestinal diseases and assess for this when appropriate.^{27,28} Fad diets should be discouraged, and any major dietary modification should be undertaken in consultation with a registered dietitian who can provide guidance and follow-up. All patients should be encouraged to consume a balanced, high-fiber diet, which is associated with a reduced risk of all-cause and cardiovascular-related mortality, stroke, type 2 diabetes, and colorectal cancer compared with a low-fiber diet.⁷⁶ We hope that this article is a useful tool to help clinicians counsel patients on the contribution of diet to their colorectal condition and the benefits of dietary modification.

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DECLARATION OF INTEREST

None.

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