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Addressing the Role of Food in Irritable Bowel Syndrome Symptom Management

Bernadette Capili, PhD, NP-C,

Assistant Professor of Nursing, Associate Director, Division of Special Studies in Symptom Management, New York University College of Nursing, 380 Second Avenue, Suite 305, New York, NY 10010, Phone: 212.992.7049, Fax: 212.995.3568, bc41@nyu.edu

Joyce K. Anastasi, PhD, DrNP, FAAN, and

Independence Foundation Endowed Professor, Director, Special Studies in Symptom Management, Director, Herbs, Nutraceuticals and Supplements Program, New York University College of Nursing, New York, NY

Michelle Chang, MS, L.Ac

Division of Special Studies in Symptom Management, New York University College of Nursing, New York, NY

Abstract

Patients with irritable bowel syndrome (IBS) have often associated the worsening of symptoms with specific foods. Research is starting to catch up with what patients have reported about food interaction and their symptoms and the role of diet is being increasingly recognized for the management of IBS. Clinical guidance for nurse practitioners can be challenging due to limited data and guideline consensus along with the nuances of symptoms associated with IBS subtypes. This article summarizes some of the key themes and dietary recommendations by various gastrointestinal (GI) organizations, public health agencies, and dietary associations. By addressing the relevance of diet for symptom alleviation, nurse practitioners are able to better support patients and collaborate with dietitians to improve symptom management.

Keywords

irritable bowel syndrome; diet; food; symptom management; gastrointestinal

Introduction

Irritable bowel syndrome (IBS) is a chronic gastrointestinal (GI) disorder denoted by abdominal pain and changes in bowel patterns, affecting 5 to 15% of the general population.^{1,2} According to the Rome III diagnostic criteria for IBS, a diagnosis of IBS is made if a patient experiences recurrent abdominal pain or discomfort at least three days per

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month in the last three months with symptom onset at least six months prior to diagnosis with two or more of the following: improvement with defecation, change in frequency of stool, and/or change in form or appearance of the stool.² IBS patients are subtyped by the predominant stool pattern: IBS with constipation (IBS-C), IBS with diarrhea (IBS-D), IBS-Mixed (IBS-M), or unsubtyped IBS (IBS-U). The pathology is understood to be multifactorial, including disturbed gut motility, enhanced visceral hypersensitivity, brain gut signaling problems, genetic factors, mucosal inflammation, immune abnormalities, intestinal microflora disruptions, and psychological and social aspects.¹

Patients with IBS have commonly associated certain foods with exacerbation of their symptoms. More than half of IBS patients have self-reported food intolerances and worsening of symptoms with certain foods or be meal related, most within 3 hours after eating, with gas problems and abdominal pain being the most frequently reported symptoms.^{3,4} IBS patients often attempt dietary modifications on their own by excluding foods they perceive to be causing their symptoms, possibly lending them to nutritional deficiencies or poorer quality diets.

The typical dietary advice for IBS symptom management is formulated more on common sense than clinical evidence. Some standard recommendations are: establishing regular eating times, eating smaller frequent meals, and drinking enough fluids.⁵⁻¹⁰ Other dietary advice includes: “eating foods that are low in fat and high in carbohydrates, such as pasta, rice, whole-grain breads and cereals, fruits, and vegetables”⁵ or reducing specific foods containing carbohydrates that are hard to digest.^{7,8} Or a very low-carbohydrate diet may improve symptoms for IBS-D.⁴ High in carbohydrates, low carbohydrates, hard to digest carbohydrates? For clinicians, understanding the nuances of individual symptoms is vital to providing the most useful and beneficial dietary recommendations. Determining which dietary approach to employ can be challenging due to limited high quality data and guideline consensus. This article discusses key evidence based themes so nurse practitioners (NPs) can better support patients and collaborate with dietitians to provide optimal management of symptoms.

Foods associated with IBS symptoms

Many IBS patients associate certain foods with their IBS symptoms and perceive food intolerance. For individuals with IBS-D, there may be a higher prevalence of food trigger reactions.⁴ The most common foods reported as symptom triggers are: fruits (citrus, banana), grains (wheat, barley, rye, oats, corn), vegetables (onions, peas, potatoes), dairy products (yogurt, milk, cheese, eggs, butter), legumes (beans, lentils), wine, chocolate, coffee, tea, and fried foods.^{3,4} Using double blind oral food challenges, items that have been confirmed include: banana, coffee, corn, eggs, milk, peas, potatoes, and wheat.⁹ The obstacles are identifying the specifics of the food trigger as well as by the physiologic stimuli. Foods contain an assortment of potential chemicals and physical components that are both absorbable and poorly absorbed which may trigger in individuals with enhanced sensitivity.¹¹ For example, certain components of foods like biogenic amines and lectins that trigger histamine release, i.e. lentils, beans, have not been fully studied in IBS.³

Key recommendations

Alcoholic beverages

The direct contact of alcoholic beverages with the mucosa lining of the GI tract can lead to mucosal damage, disrupt the assimilation of nutrients and intestinal motility.¹² Prior studies have been inconclusive or conflicting for alcohol, and alcohol intake was not correlated to IBS in epidemiologic studies.⁹ For individuals with IBS-D, alcohol intake may exert a more potent influence on symptom severity than for IBS-C or IBS-M.¹² An association between alcohol intake, particularly binge drinking (4 or more drinks on one occasion), and symptoms like diarrhea and abdominal pain has been observed among females with IBS but not for moderate (max 3 drinks/day) or light drinkers (1 drink/day). Psychosocial stress plays a role in IBS and the misuse of alcohol to alleviate stress is a factor to consider screening patients for heavy drinking and alcohol use disorders.

Caffeine

Caffeine stimulates gastric acid secretion and colonic motor activity, particularly coffee.⁴ In a study of 330 IBS patients, coffee was one of the top ten most frequently foods reported producing symptoms and the three most common symptoms reported were: dyspepsia, pain, and loose stools.³ There are no randomized controlled studies of low caffeine diets, but most dietary guidelines suggest modifying caffeine intake and encourage fluids from non-caffeinated sources.^{5,7-10} The NICE guidelines suggest limiting the consumption of coffee and tea to no more than three cups per day.¹⁰ The bowel stimulating qualities of coffee may be worse for people with IBS-D than IBS-C and other sources of caffeine to watch for include: soft drinks, coffee ice cream, dark chocolate, unsweetened baking chocolate, cocoa powder, and some over the counter analgesics.

Lipids/Fatty foods

Fatty foods are often attributed to symptoms by IBS patients and it is often recommended to avoid foods rich in fat particularly for those IBS sufferers with gas-related symptoms and diarrhea.^{5,7-10} Laboratory studies have shown intestinal gas transport is delayed by intraluminal lipids, and duodenal lipids inhibit small bowel motility.⁴ Further, lipids' effects on gastric emptying and enhancement of colorectal sensitivity or visceral perception have also been studied.¹³ Despite such laboratory studies, the evidence relating dietary fat intake to IBS is limited. Few studies have evaluated dietary intake and eating behavior, and most have been unable to determine the fat content of diets that may provide clinical benefit.¹³ For IBS-D patients who perceive certain fatty foods to be triggers, NPs can caution on the intake of low fat processed foods, which may contain more sugar, and instead emphasize healthy and naturally lower fat foods like fruits, vegetables, and lean meats/fish.

Cross sectional studies have shown that IBS symptom severity is associated with increased BMI¹⁴ therefore it is also important for NPs to screen patients for overweight (BMI 25 to 29.9 kg/m²) and obesity (BMI of 30 kg/m²) conditions and offer or refer appropriate counseling and behavioral modifications.

Fiber

Dietary fiber intake is often less than recommended (25–38 g for adults in the US) with usual intakes averaging only 15 g per day.¹⁵ A typical diet comprised of refined sugars and grains, dairy products, and processed foods is often low in dietary fiber, which may exacerbate constipation. For years, augmenting the intake of dietary fiber intake has been a common strategy, particularly for IBS-C.^{2,5,7–10} However, for some, fiber may exacerbate symptoms and can frequently cause bloating and abdominal discomfort.¹⁶ The efficacy of fiber requires careful investigation and discrimination. Fibers are often simply categorized into soluble and insoluble but some fibrous foods have both attributes like psyllium, oats, and oat bran. Most plant based foods contain both soluble and insoluble fibers. Fiber can also be considered by viscosity and fermentability, i.e. insoluble, slowly fermentable fibers like wheat bran and soluble fibers with low viscosity like hydrolyzed guar gum. (See Table 1.) The rapid fermentability of soluble non-viscous dietary fiber (guar gum, wheat dextrin) can lead to gas whereas the soluble viscous (psyllium, polycarbophil) and insoluble fibers (wheat bran, cellulose) which are relatively less fermentable often result in less flatulence.¹⁵

Many of the early studies for fiber were conflicting due to poor quality and did not specify IBS subtypes.¹⁶ Most studies have investigated the use of dietary supplements as opposed to the intake of actual everyday high fiber foods. Soluble fibers, particularly fermentable fiber like psyllium may provide some benefit for some IBS-C patients as opposed to insoluble fibers like wheat bran, which is not advised.^{2,8,16} A randomized controlled trial which compared the efficacy of psyllium(10g/day) and wheat bran(10g/day) found that psyllium resulted in a significant greater proportion of patients reporting reduction of symptom severity compared with placebo, except for abdominal pain or health-related quality of life. Meanwhile bran showed no benefit and the dropout rate was highest among patients receiving bran, mostly due to exacerbation of symptoms.¹⁶

Flaxseed or linseed, a rich source of soluble fiber as well as α -linolenic acid and lignans, may affect GI transit time and/or motility. The British Dietetic Association has a recommendation of a 3 month trial of ground linseed for IBS-C individuals however, there is limited clinical evidence for relief of constipation, abdominal pain or bloating.⁸ A small randomized open pilot study comparing different preparation of linseeds for relief of IBS symptoms reported no statistical significance in improvement of stool frequency or consistency, or symptom severity.¹⁶

For IBS-D or IBS-M, soluble viscous fiber with limited fermentability can aid with stool consistency. While fibers with both soluble viscous and insoluble properties may be useful for their laxative effect for IBS-C, soluble viscous fibers with limited slow fermentability is preferable to avoid increased gas and cramping.¹⁵

Fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs)

The incomplete absorption of lactose and fructose has been suspected to play a part for certain subgroups of IBS patients.⁴ Yet, controlled studies have suggested that intolerance for sugars is not more prevalent in IBS and incomplete absorption after 50g of fructose has

been noted in up to 75% of IBS sufferers and up to 80% of healthy subjects.¹⁷ However, malabsorption of these sugars may lead to digestive problems such as bloating, flatulence, abdominal pain, and diarrhea. For those with lactase deficiency or lactose malabsorption, the amount tolerated varies individually, but research suggests that up to 12g can be handled if spread out during the course of a day.¹⁰ A cup of milk or plain yogurt has approximately 12 g while 1.5 oz of low fat hard cheese has less than 1 g.

Recently, a broader collective term of short-chain carbohydrates, FODMAPs has come into focus. FODMAPs are osmotically active, not easily absorbed, and prompt fermentation in the colon, luminal gas production and distension.¹⁸ A dietary approach has been developed in terms of “low” and “high FODMAP” content food for the management of functional GI symptoms. Sources of high FODMAPs are disaccharides in dairy products, galacto-oligosaccharides in legumes, fructans in wheat containing breads and cereals, fructans and fructo-oligosaccharides in some vegetables (asparagus, artichokes, onions), fructose in fruits (mangos, peaches, apples) and polyols (sorbitol, mannitol, xylitol, lactitol). (See Table 2.) Polyols are used as sweeteners, commonly found in food products labeled “sugar free” and sorbitol is naturally found in dried fruits and stone fruits.

Recent studies of low FODMAP diets in reducing GI symptoms have shown promising preliminary data emerging from Australia and the United Kingdom.¹⁸ One study demonstrated that a low FODMAP diet decreased the severity of GI symptoms in 30 subjects (10 IBS-D, 13 IBS-C, 5 IBS-M, 2 IBS-U), specifically lessening abdominal pain, bloating, and flatulence.¹⁹ In that study, a low FODMAP diet was defined as less than 0.5 grams of oligosaccharides, fructose and polyols per meal while a typical Australian daily diet contains approximately 4 grams of oligosaccharides and 2 grams of polyols.

Dietary advice of reducing FODMAP intake may be beneficial for short term management for those suffering with abdominal pain, bloating or flatulence.¹⁸ In a non-randomized observational study of 90 IBS patients, a low FODMAP dietary consultation improved abdominal pain/discomfort, bloating, constipation, and bowel urgency, with almost 75% reporting symptom relief satisfaction.²⁰ However, a more recent study comparing a low FODMAP dietary recommendation to traditional dietary advice for IBS (i.e regular eating times, reduced coffee/alcohol intake) determined that a low FODMAP diet was not superior and that symptom severity was reduced in both groups with no significant difference.²¹

Most of the FODMAP diets studied have been strict in that all food was provided to the subjects during the study, mostly in a one to one setting by a registered dietitian for up to 6–8 weeks, and their exact contribution to IBS needs clarification. How much FODMAP intake should be reduced in one meal or one day? Does a food’s measurement of FODMAPs vary depending on its processing, temperature, or maturation? Is it more helpful for symptoms of gas and bloating or stool frequency? More research is needed as studies have demonstrated that a low FODMAP diet significantly reduced luminal bifidobacteria and may have effects on gut microbiota composition.²² For now, the long term effects of low FODMAP diets on gut microbiota remain unclear and it is not recommended for long term adherence or asymptomatic populations.

Gluten/Wheat

Gluten is the main protein found within the wheat germ that provides the consistency of dough. Gluten is a conglomeration of proteins, the prolamins gliadin and glutenin (found in wheat). Secalin in rye and hordein in barley are similar proteins to gliadin. Gliadin induces the release of zonulin, a protein that modulates intestinal permeability.²³ The consumption of foods that contain gluten and the symptom aggravation experienced by IBS patients, who are negative for celiac disease, deserves further investigation. A small study of 34 non-celiac IBS subjects (approx. half were IBS-D, a third were IBS-M) whose symptoms were controlled by a gluten free diet experienced exacerbation of symptoms such as pain and fatigue during a gluten rechallenge.²⁴ For those consuming the gluten diet, changes in symptom severity for abdominal pain ($P=0.02$), satisfaction with stool consistency ($P=0.03$), and tiredness ($P=0.001$) were statistically significant, but overall symptoms ($P=0.15$) were not over the six week study period.²⁴ Another study of 45 IBS-D patients on a diet including gluten experienced a small increase in stool frequency in comparison to a gluten free diet, which also suggests that cutting out gluten may be beneficial.²⁵ However, a double-blind, randomized, controlled, cross-over rechallenge study of 37 patients with IBS (43% diarrhea, 35% constipation, 22% mixed or alternating) and non-celiac gluten sensitivity who followed a low FODMAP diet showed no specific or dose-dependent effects of gluten.²⁶

As more research develops on this topic, increasing the consumption and variety of other kinds of grains/cereals may be helpful for some patients. For those non-celiac patients with IBS who are avoiding gluten, NPs need to be aware of potential nutritional deficiencies as many fortified wheat based products and cereals are sources of B vitamins and dietary fiber. Some patients may be eating processed gluten-free products which can be laden with excess calories, fat, salt, and sugar and may contribute to risk factors for heart disease and diabetes.

Food additives

There have been no studies investigating chemical additives in foods and GI reactions in IBS but intolerance or sensitivity to additives in processed foods (preservatives, emulsifiers, artificial flavorings/colors) may be associated with hypersensitivity reactions for some.¹¹ Until further research is conducted, knowledge of the presence and availability in certain foods may be noted for some patients.

Conclusion

In clinical practice, the reporting of specific foods with IBS symptoms by patients is sometimes viewed with uncertainty or oversight. But, the role of food and diet is being increasingly recognized to play a pivotal role in the management of symptoms. With the variation of IBS symptom presentation, successful management with diet and lifestyle changes involves the careful discrimination of dietary treatments based on the predominant symptoms and severity. Current dietary recommendations are broad and a “one size” approach is not optimal as symptoms may change over time. Diet recommendations need to be individualized and NPs can work with trained dietitians to provide the guidance and attention required to avoid restrictive diets and the risk of nutritional deficiencies. Future

studies are needed on the efficacy and safety of dietary therapies with explicit consideration of IBS predominant symptoms and long term follow up.

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Highlights

Irritable bowel syndrome (IBS) is a chronic gastrointestinal (GI) disorder denoted by abdominal pain and changes in bowel patterns, affecting 5 to 15% of the general population

Patients with IBS have long associated certain foods with exacerbation of their symptoms. More than half of IBS patients have self reported food intolerances and worsening of symptoms with certain foods or meal related.

IBS patients often attempt dietary modifications on their own by excluding foods they perceive to be causing their symptoms.

Research is starting to catch up with what patients have reported about food interaction and their symptoms and the role of diet is being increasingly recognized for the management of IBS.

For clinicians, understanding the nuances of individual symptoms is vital to providing the most useful and beneficial dietary recommendations.

Table 1

Fiber supplements and foods¹⁵

Fiber Supplements	
<u>Soluble and Viscous (limited/less fermentable)</u> Methycellulose (Citrucel) Calcium polycarbophil (Fibercon) Psyllium (Metamucil, Konsyl) <u>Soluble and viscous (rapidly fermented)</u> Beta glucan (oat bran) Pectin <u>Soluble and Non -Viscous (rapidly fermented)</u> Inulin (FiberChoice) Partially hydrolyzed guar gum Wheat dextrin (Benefiber) Acacia	<u>Insoluble fiber (limited/ less fermentable)</u> Wheat bran Corn bran Cellulose
Fiber rich foods	
Most plant based foods contain mixtures of fiber.	
<u>Soluble Fiber</u> Grains - oats, barley Nuts Seeds - flaxseed, sunflower, chia Beans/legumes Vegetables- carrot Fruits - orange, grapefruit	<u>Insoluble Fiber</u> Whole grains - whole wheat, brown rice Nuts Seeds Beans/legumes Vegetables - dark green leafy, corn, broccoli, cabbage, cauliflower Fruits - with skins, apple, pear, grapes

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Table 2

FODMAPs^{4,11}

High FODMAP foods	Low FODMAP foods
Asparagus, artichokes, broccoli, cabbage, cauliflower, garlic, leek, onion, sugar snap peas	Alfalfa, bean sprouts, green beans, bell peppers, bok choy, carrots, celery, cucumber, eggplant, kale, lettuce, radish, spinach, squash, tomato, turnip, zucchini
Apples, blackberries, pears, mango, watermelon, nectarines, peaches, plums, dried fruits	Banana, blueberry, cantaloupe, honeydew, grapes, kiwi, orange, pineapple, raspberry, strawberry
Milk (cow, goat, sheep), yoghurt, soft cheese, cream, custard, ice cream	Lactose-free milk, lactose-free yogurts, hard cheese
Legumes/pulses	Meats, fish, chicken, eggs, tofu, tempeh
Rye, wheat breads, wheat-based cereals, wheat pasta	Gluten-free bread and pasta, sourdough spelt bread, oats, rice, quinoa
Cashews, pistachios	Almonds, hazelnuts, pumpkin seeds walnut, macadamia, peanut, pecan, pine nut
Sauce, jam, salsa or salad dressing with high fructose corn syrup, honey, agave, carob powder, artificial sweeteners (mannitol, sorbitol, xylitol)	Jelly, marmalade, butter, nut butters, mustard, mayonnaise, olives, cocoa powder, vinegar, soy sauce, cooking oils

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