



Medical Nutrition Therapy in Lower Gastrointestinal Diseases: Irritable Bowel Disease

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فوق دکترا و متخصص تغذیه و رژیم درمانی

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Outline

Intestine Structure & function

Gut Microbiome & dysbiosis

Celiac disease & gluten related disorders

Inflammatory bowel disease

- Ulcerative Colitis

- Crohn's disease

Irritable Bowel Disease

Diverticular Diseases

- Diverticulosis

- Diverticulitis

Irritable Bowel Disease (IBS)

- Chronic GI disorder
- A group of symptoms that affect the abdomen including abdominal cramping or pain, bloating, gas, and altered bowel movement patterns
- Common in young women
- Affecting up to 15% of the international population
- No sign of damage due to disease
- Impairment in muscle contractions and bowel movement

IBS pathophysiology

- Visceral hypersensitivity: Exaggerated response to specific stimuli (intolerance or hypersensitivity)
- Brain-gut axis: a change in the nervous system communication between the GI & Brain
- Alteration in GI motility: Sensory and motor disorders of the colon
- Neurotransmitter imbalance (decreased serotonin)
- Dysbiosis (gut microbiome imbalance)
- Post-infectious
- Genetics

IBS symptoms

- Pain, distension, abdominal discomfort and bloating
- Abnormal bowel habit with period of diarrhea and constipation
- Sensation of incomplete bowel movement
- Mucus in the stool

Types of IBS

- **Constipation-predominant (IBS-C):** symptoms (cramping and abdominal pain) commonly triggered by eating
- **Diarrhea-predominant (IBS-D):** symptoms occur first in the morning or after eating
- **Alternating constipation and diarrhea (IBS-M)**

IBS Diagnosis

- Abdominal pain and discomfort last for 12 weeks not consecutively
- A change in the frequency and consistency of stool
- Urgency or a feeling that you cannot empty your bowel completely
- Mucus in your stool
- Bloating and abdominal distention

Additional test

- Flexible sigmoidoscopy
- Computerized tomography (CT) scan: cross-sectional x-ray images of internal organ
- Colonoscopy
- Lactose intolerance test: breath test or milk elimination

Treatment

- Medication
 - Antispasmodics (Dicyclomine, hyoscine)
 - Tricyclic antidepressant (amitriptyline, nortriptyline)
 - Selective serotonin uptake inhibitors (Fluoxetine, sertraline, citalopram)
 - Probiotics: *Lactobacillus*, *Bifidobacterium*, *Escherichia*, *Streptococcus*
- Diet:
 - Excluding gas-producing foods (Lentils, legumes, beans)
 - Low FODMAP diet
 - Fiber supplementation
 - Lactose avoidance
 - Gluten avoidance
- Psychological intervention

Medications

IBS-C:

- ❖ Laxatives: psyllium
- ❖ Chloride channel activators: lubiprostone
- ❖ Serotonin agonist

IBS-D:

- ❖ Antibiotics
- ❖ Antimotility agents: loperamide, diphenoxylate
- ❖ Serotonin antagonists: alosetron, cilansetron

Dietary management of IBS

Recommendations:

- Normalize eating patterns, eat at a relaxed pace at consistent times, with small, frequent meals, ensure adequacy of all nutrients
- Adjust diet for all food allergies and intolerances, common problem foods, include wheat, yeast, and eggs.
- Reduce lactose if lactose intolerant
- Low-FODMAP diet
- Use of Prebiotics and Probiotics

Dietary management of IBS

- Progress slowly to a diet adequate in fiber (25-35 g/d)
- Ensure adequate fluid intake
- **Foods to avoid:** alcohol, black pepper, caffeine, other products with caffeine including energy drinks, chili powder, cocoa/ chocolate, coffee, colas, garlic, red pepper, spicy food, sugars, Artificial sweeteners (sorbitol and xylitol), Dairy products, including milk, cheese, and ice cream; fatty foods; foods high in sugar
- Supplement with B-Complex vitamins, Calcium, vitamin D, riboflavin (if lactose is not tolerated)
- Supplement of 1 Tbsp daily of a bulking agent, such as Metamucil, may be helpful; avoid bran supplements, as they may be irritating

Low-FODMAP diet

Fermentable

Oligosaccharides – few simple sugars linked together (fructans, galactans)

Disaccharides – double sugar (lactose)

Monosaccharides – single sugar (fructose)

And

Polyols – sugar alcohols (sorbitol, mannitol, isomalt, xylitol, glycerol)

Low-FODMAP diet

- A diet that cuts back on a group of fibers and sugars that can be poorly absorbed by your GI tract
- This includes foods containing:
 - Fructose, lactose, sugar polyols
 - Sorbitol & Mannitol
 - Fructans (found in garlic, leeks, artichokes, and wheat)
 - Galacto-oligosaccharides (found in lentils, chickpeas, and green peas)
- Only for short-term use to help reduce IBD symptoms

FODMAPs produce symptoms in IBS patients

- ❖ Poorly absorbed in the small intestine
- ❖ Delivered to the colon & rapidly fermentable by gut bacteria producing gas and short-chain fatty acids
- ❖ Production of osmotically active molecules increasing water load to the colon
- ❖ Be cautious of being overly restrictive: 6-8 wks trial with gradual reintroduction of foods

High FODMAP Foods

(Avoid these foods during the FODMAP elimination phase)

Grains

Barley

Rye

Wheat (crackers, cereal, pasta, bread, baked goods) **sourdough bread is allowed*

Fruit

Apples/apple juice/cider

Apricot

Asian pear

Blackberries

Cherries

Dates

Figs

Fruit in natural juices

Grapefruit

Mango

Nectarine

Peaches

Pears/pear juice

Persimmon

Plums

Prunes

Watermelon

Vegetables

Artichoke

Asparagus

Cauliflower

Garlic

Leeks

Mushrooms

Onion/shallots

Sugar snap peas

Dairy

Custard

Frozen yogurt

Ice cream

Milk

Pudding

Soft cheese (cottage, ricotta)

Yogurt

Nuts/Legumes

Cashews

Pistachios

Legumes: black beans, kidney beans, pinto beans, baked beans, soy beans, hummus (canned chickpeas and lentils are allowed in small portions)

Sweeteners

Agave

High fructose corn syrup

Honey

Sugar alcohols (found in sugar-free gum, candy, and some medicine): sorbitol, mannitol, xylitol, maltitol, erythritol, isomalt,

Beverages

Chamomile, oolong, fennel, & chai tea

Coconut milk

Coffee made with chicory

Rice milk

Rum

Soy milk

Foods High in FODMAP

Foods High in FODMAPs: Limit or Avoid				
Fructans	Fructose	Galactans	Lactose	Polyols
<p><i>Fruits:</i> persimmon, watermelon</p> <p><i>Grains:</i> rye and wheat products in high amounts</p> <p><i>Vegetables:</i> artichokes, asparagus, beets, broccoli, Brussels sprouts, cabbage, eggplant, fennel, garlic, leek, okra, onions, shallots</p> <p><i>Other:</i> pistachios and products containing chicory, inulin</p>	<p><i>Fruits:</i> apple, mango, pear, watermelon</p> <p><i>Sweeteners:</i> agave, corn syrup, fructose, high-fructose corn syrup, honey</p>	<p><i>Legumes:</i> baked beans, chickpeas, kidney beans, lentils, soybeans</p>	<p><i>Cheeses:</i> cottage cheese, cream cheese, ricotta, and other soft, unripened cheeses</p> <p><i>Milk:</i> cow's, goat's, and sheep's milk and products from milk such as ice cream and yogurt</p>	<p><i>Fruits:</i> apple, apricot, avocado, blackberries, cherries, nectarine, peach, pear, plum, watermelon</p> <p><i>Sweeteners:</i> isomalt, maltitol, mannitol, sorbitol, xylitol</p> <p><i>Vegetables:</i> cauliflower, corn, green bell pepper, mushrooms</p>

Data from Alexander C. Ford, et al, "American College of Gastroenterology Monograph on Management of Irritable Bowel Syndrome," *American Journal of Gastroenterology* 113, supp 2 (2018): 1-18.

Low FODMAP Foods

(Allowed during the elimination phase)

Grains and Starches

Cheerios (plain)*
Corn flakes*
Corn tortillas
Gluten free bread/cereal* Udi's GF white bread
Gluten free crackers*
Gluten free pasta: rice, quinoa, corn
Grits
Oatmeal (1/2 cup dry)*
Polenta
Popcorn
Potato
Potato Chips*
Quinoa
Rice, brown or white
Rice/popcorn cakes*
Rutabaga
Soba noodles, 100% buckwheat flour*
Sourdough bread- whole wheat or white (2 slices)*
Sweet potato (1/2 cup)
Tortilla chips*

Fruits

**Limit intake of fruits to one serving/ meal or snack.

Avocado (1/8th)
Banana
Blueberry
Cantaloupe
Clementine

Coconut, shredded (1/4 cup)
Cranberry
Dried cranberries and raisins (1 Tbsp)
Grapes
Honeydew melon
Kiwifruit
Lemon or Lime
Mandarin orange
Orange juice
Orange
Papaya
Pineapple
Pomegranate (1/2)
Raspberry
Rhubarb
Strawberry

Vegetables

Alfalfa sprouts
Bamboo shoots
Bean sprouts
Bell pepper
Beet (2 slices)
Bok choy
Broccoli (1/2 cup)
Brussels sprouts (1/2 cup)
Carrots
Celery (1/4 stalk)
Cabbage (red, common cabbage or 1/2 cup savoy)
Chives
Corn (1/2 cob or 1/3 cup)
Cucumber
Endive

Eggplant
Fennel bulb
Green beans
Green peas (1/4 cup), snow peas (5 pods)
Kale
Lettuce (iceberg, romaine, baby lettuce, etc)
Okra (6 pods)
Olives
Parsnip
Pumpkin (1/4 cup)
Radish
Spinach
Spring onion/scallion (green part only)
Squash (butternut: ¼ cup)
Swiss chard
Tomato: (avoid sundried tomatoes and tomato products with added onion/garlic)
Turnip
Water chestnuts
Zucchini

Dairy

Almond milk*
Hard/aged cheeses: all, including feta
Hemp milk*
Kefir (99% lactose free)*
Lactose free ice cream*
Lactose free milk
Lactose free yogurt*
Lactose free cottage cheese

American College of Gastroenterology Evidence & Recommendation Grading for IBS Management

Intervention	Strength of Evidence	Recommendation
Low FODMAP diet	Very low	Weak
Gluten-free diet	Very low	Weak
Fiber	Moderate	Strong
Prebiotics/synbiotics	Very low	Weak
Probiotics	Low	Weak
Peppermint oil	Low	Weak

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Low-FODMAP Tips

- Fiber is a part of carbohydrate that is not digested by your body. Fiber is found in plant foods such as fruits, vegetables, whole grains, and legumes (dried beans, peanuts).
- Since some high-fiber foods are also high FODMAP, this diet may limit your fiber intake. Carefully plan your meals to include alternative fiber sources.
- Patients who have IBS and constipation may benefit from eating more fiber. However, if you have IBD and constipation, eating more fiber is not recommended (unless you are in remission and do not have any strictures).

Preparing for the Low-FODMAP Diet

Keep a food record of your usual intake and symptoms for 7 days. Each day, record:

1. Your food and beverage intake
 - When you ate and drank
 - How much you ate and drank

2. Your symptoms
 - Type of symptom
 - Severity of symptom
 - Timing or onset of symptom

Prepare for Grocery Shopping and Reading Food Labels

- Carefully plan all your meals—those eaten at home and those eaten away from home.
 - Make shopping lists of appropriate foods. Read food labels and ingredient statements carefully:
 1. The higher up an ingredient appears on an ingredient list, the more of that food is contained in the product. Use the ingredients list to identify FODMAP foods so you know which products to avoid.
 - If high-FODMAP ingredients are listed at the bottom of an ingredient list, the food may still be considered low-FODMAP and allowed on your diet.
 2. Check food labels to select low-FODMAP foods containing 3-4 grams of fiber per serving and include them in daily meals.

Nutrition Facts	
8 servings per container	
Serving size	2/3 cup (55g)
Amount per serving	
Calories	230
% Daily Value*	
Total Fat 8g	10%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
Protein 3g	

Ingredients: Brown sugar, white sugar, almonds, pecans, walnuts, eggs, butter, chocolate chips, milk, whole wheat flour, (wheat), vanilla extract, sea salt, baking soda, xanthan gum,

Contains: Nuts, eggs, milk, wheat

Following the Low-FODMAP Diet

Step 1: Eliminate High-FODMAP sources from your diet.

- Meet with your RDN to review your food symptom diary. Your RDN will review the low FODMAP diet and help you understand which foods to eat and which to avoid.
- Follow the low-FODMAP diet for **2-6 weeks** to reduce your symptoms. Aim to drink 64 ounces of **water daily**. Avoid foods that are made with high amounts of **dairy**, high-FODMAP fruits and vegetables; regular pastas and bread that contain **wheat**, barley, rye as ingredients; and **sweeteners** such as high-fructose corn syrup, honey, and inulin. Use the list of foods recommended for guidance on what foods fit these criteria.
- **Limit portion sizes** at each meal to keep the FODMAP level low enough to avoid symptoms. The following portion sizes of low-FODMAP foods are allowed.

Portion Sizes

Dairy	6 ounces of lactose-free* yogurt 8 ounces of lactose-free* milk 1 ounce of aged cheese *if not lactose-free, serving size is smaller
Fruit	1 small banana 1 small orange 1 small handful of berries 1 small handful of grapes 1/3 to 1/2 cup of 100% juice (not made from fruit on the high-FODMAP food list)
Vegetables	1/2 cup serving
Grains	1 slice of bread* * Traditionally made sourdough breads baked with wheat or spelt can be included in a low-FODMAP diet (avoid other breads made with wheat, rye, and barley) 1/2 cup cereal or grains** ** Choose grains that are low in gluten (wheat, barley, and rye should not be major ingredients). You do not need to totally avoid gluten unless you have been diagnosed with celiac disease. If you do not have celiac disease, you may consume gluten-containing foods in small amounts only, like the crumb coating on fried chicken.

Step 2: Test Your Tolerance to FODMAP Foods by Introducing High-FODMAP Foods

After the initial strict phase of the diet, meet with your RDN, who will advise you as you begin reintroducing foods back into your diet. When you begin to reintroduce foods from the high-FODMAP categories (see the Foods Not Recommended list), be sure to eat them in the amounts listed in the Portion Sizes table.

- Introducing high-FODMAP groups one at a time will help you learn which foods cause your symptoms. Your RDN will design a plan and include which foods and serving sizes are recommended for you.
- Check with your RDN to determine how quickly to reintroduce high-FODMAP foods into your diet.

Slower approach: Introduce a high-FODMAP food then wait a couple of days before introducing another high-FODMAP food to “rest” between food reintroductions. Only reintroduce two foods in a given week.

OR

Faster approach: Introduce one type of high-FODMAP food each day.

- Continue to limit portion sizes at each meal according to the Portion Sizes table. This will make it easier to identify the foods causing your symptoms

Step 2: Test Your Tolerance to FODMAP Foods by Introducing High-FODMAP Foods:

- As you reintroduce new foods, keep detailed food symptom records to identify all triggering foods that cause symptoms.

Each day, you should record:

1. Your food and beverage intake
 - When you ate and drank
 - How much you ate and drank
 2. Your symptoms
 - Type of symptom
 - Severity of symptom
 - Timing or onset of symptom
- Your RDN will adjust your diet plan to limit the foods that cause increased symptoms and explain what foods to avoid.

Foods Recommended (Low-FODMAP Foods)

Foods that are listed in **bolded text** are low-FODMAP in any serving size. Other foods (not bolded) are only low-FODMAP when serving size is limited.

Food Group	Foods Recommended
Grains	<p><i>Gluten-free grains:</i> arrowroot, buckwheat flour, cornmeal, cornstarch, gluten-free flour blends, glutinous rice, ground rice, millet, oat bran*, oatmeal*, polenta, potato flour, quinoa*, rice (brown*, white), rice bran, rice flour, sago, sorghum, tapioca, wild rice*</p> <p><i>Cereals:</i> baby rice cereal, cream of buckwheat, rice- or corn-based breakfast cereals, oatmeal*, wheat-free, fruit free muesli</p> <p><i>Pasta and Noodles:</i> rice noodles, rice vermicelli, gluten-free pasta</p> <p><i>Breads and Baked Goods:</i> gluten-free breads,** corn tortilla/taco shells, corn-based crackers, pretzels (½ cup), plain rice cakes/rice crackers, gluten-free cookies,** gluten-free cakes/pastries,** sourdough breads made of wheat or spelt</p>
Protein Foods	<p>Unseasoned, tender, well-cooked poultry or fish; unseasoned beef; or unseasoned pork</p> <p>Bacon</p> <p>Eggs</p> <p>Almonds (fewer than 10 nuts)*, hazelnuts (fewer than 10 nuts)*; macadamias*, peanuts*, pecans*, pine nuts*, walnuts*</p> <p>Seeds* (chia, pumpkin)</p> <p>2 tablespoons smooth peanut butter</p> <p>Tofu, firm (drained); tempeh</p>

Foods Recommended (Low-FODMAP Foods)

Dairy	<p>Lactose-free milk Calcium-fortified rice milk; soy milk made from soybean extract (not whole soybeans) Most lactose-free yogurts and lactose-free kefir Lactose-free cottage cheese 2 tablespoons soft cheeses (cottage cheese or ricotta) 1 ounce hard, aged, or ripened cheeses (brie, camembert, feta) Lactose-free ice cream Sorbets made from suitable fruits and sweeteners</p>
Vegetables*	<p>Alfalfa sprouts, bamboo shoots, bean sprouts, bell pepper, bok choy, broccoli, Brussels sprouts, cabbage (common or red), canned artichoke hearts (1 ounce), carrot, corn ($\frac{1}{2}$ cob), cucumber, eggplant, green beans, lettuce (butter, iceberg), olives, parsnip, potatoes, pumpkin, rutabagas, seaweed, sweet potato ($\frac{1}{2}$ cup), Swiss chard, spinach, scallion (green part only), squash (yellow, spaghetti), tomatoes, turnips, watercress, yams, zucchini</p>

Foods Recommended (Low-FODMAP Foods)

Fruits*	Bananas, blueberries, cantaloupe, dried cranberries (1 tablespoon), grapes, honeydew melon, kiwi, lemons, limes, mandarin oranges, oranges, passion fruit, papaya, pineapple, plantain, dried banana chips (no more than 10 chips), dried shredded coconut (less than ¼ cup), raspberries, star fruit, strawberries, tangelos, tangerines
Oils	Vegetable oils, garlic-infused oil, butter, ghee, lard, margarine (trans fat free)
Other	<p><i>Beverages:</i> Water, mineral water, soda water, sugar-sweetened soft drinks, tonic water, fruit juice (choose only juices made from fruits listed in the Fruits section of this table; limit to ½ cup). Orange juice (one 4-ounce glass freshly squeezed) or cranberry juice (4 ounces), most teas/coffees/alcohol***</p> <p><i>Fresh Herbs:</i> Basil, coriander, parsley, rosemary, thyme</p> <p><i>Spreads and Condiments:</i> Jam (without high-fructose corn syrup), marmalade (with appropriate ingredients and no high-fructose corn syrup), mayonnaise, mustard, soy sauce, garlic-free sweet chili sauce or hot sauce, pickles/relish, soy sauce, tamari, vinegar</p> <p><i>Sweeteners:</i> Sucrose (table sugar, cane sugar), including superfine sugar, confectioner’s sugar, brown sugar, raw sugar, glucose; maple syrup, molasses, artificial sweeteners not ending in “ol” (aspartame, saccharine, and stevia)</p> <p><i>Other:</i> Baking powder, baking soda, cocoa, coconut, gelatin, salt, fresh and dried herbs and spices (not including garlic and onion powder), chives, ginger</p>

Foods Recommended (Low-FODMAP Foods)

*Foods to limit if lowering your fiber intake for IBD or IBS. Choose canned and well-cooked fruits and vegetables without seeds, skins, or hulls to reduce fiber.

**Gluten-free foods may contain FODMAPS. Read ingredients lists carefully.

*** See the Foods Not Recommended table for which teas, coffees, and alcohol should be avoided.

Foods Not Recommended

Food Group	Foods Not Recommended
Grains*	Barley,* bulgur,* chickpea flour (besan)*, couscous (wheat),* durum,* Kamut,* lentil flour*, multigrain flour,* pea flour*, rye,* semolina,* soy flour*, triticale,* wheat bran,* wheat flour,* wheat germ* Wheat-based, mixed-grain cereals,* muesli,* chicory root,* inulin* Noodles, pasta, spaetzle, gnocchi Breads, bread crumbs, cookies, cakes, croissants, muffins, pastries containing wheat/rye
Protein Foods	Black-eyed peas* Dried beans,* chickpeas,* or lentils* Sausage (may contain onion and dehydrated vegetable powders) Soybeans* Pistachios* and cashews* Fatty meats Fried meats
Dairy	Buttermilk Chocolate milk Custard Milk (cow's, goat's, sheep's, condensed, evaporated) Sauces that are milk-based or cheese-based Soft cheeses (in amounts greater than ½ cup): cottage, ricotta Sour cream Soy milk (made from soybeans) Yogurt Ice cream

Continued

Vegetables*	Artichokes, asparagus, cabbage (savoy), cauliflower, celery, garlic, leeks, mushrooms, onions (all), scallions (the part that is white), shallots, snow peas, sugar snap peas
Fruits*	Apples, applesauce apricots, Asian pears, avocados, blackberries, boysenberries, cherries, figs, mangoes, nectarines, peaches, pears, persimmon, plums, prunes, tamarillo, watermelon
Other	<p><i>Beverages:</i> Apple, pear and mango juices; other fruit juices in amounts over ½ cup, made with high-fructose corn syrup (HCFS), fortified wines (sherry, port), chamomile tea, fennel tea, chicory-based drinks or coffee substitutes</p> <p><i>Spreads and Condiments:</i> Chutneys, hummus, jellies, gravies made with onion, pickle, relish, salad dressing or sauces made with, salsa, stock, tomato paste</p> <p><i>Sweeteners:</i> Agave nectar, artificial sweeteners (isomalt, mannitol, maltitol, sorbitol, xylitol) honey, corn syrup solids, fructose, fruit juice concentrate, high-fructose corn syrup, and polydextrose.</p>

ADIME IBS

Assessment

- Abdominal pain, nausea, diarrhea, constipation, abnormal stooling
- Diet Hx (food intolerance, sensitive), chronic laxative use, avoidance of specific foods
- Laboratory: specific nutrients, if diarrhea predominant IBS and/or avoidance of specific foods

ADIME IBS

Nutrition Diagnosis

-Altered GI function AEB altering diarrhea/ constipation with subsequent avoidance of specific foods

ADIME IBS

Intervention

- Small, frequent meals, ensure adequacy of all nutrients
- Adjust diet for food allergies/ intolerance; avoid lactose (if lactose intolerant)
- Low-FODMAP diet
- Supplement prebiotics and probiotics
- Gradual increase to adequate fiber, with adequate fluid
- Avoid high fat intake
- Supplement with B-complex vitamin

ADIME IBS

Monitoring & Evaluation

Meal pattern: changes in stools (frequency, consistency)

Fiber & fluid intake

Lab values for specific nutrients

Control of GI symptoms



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