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The Role of FODMAP Diet in Functional Disorders of the Gastrointestinal Tract

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Abstract

Food is increasingly recognized as a factor that can significantly influence the symptoms of certain chronic diseases. In this article, we review the effects of a diet low in Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols (low FODMAP diet), on the course of disease entities such as IBS, SIBO, GERD, and constipation. In this article, we present both positive and negative aspects of following this diet. The results of the study showed that patients receiving a low FODMAP diet experienced a statistically significant reduction in pain and bloating compared to patients receiving a traditional diet; with respect to stool consistency, there was no significant difference between treatments. Patients on a low FODMAP diet described a significant reduction in abdominal pain and bloating compared with those on a high FODMAP diet. In cohort studies, pain and bloating were significantly reduced after treatment compared to baseline diet. We conclude that there is evidence that a low FODMAP diet may have beneficial effects mainly on the symptoms of IBS, especially abdominal pain and bloating as well as other disease entities characterized by similar clinical symptoms. This diet is very restrictive, so it is necessary to consult a specialist (dietician/gastroenterologist) in order to prepare it in a rational and harmless way. Such drastic nutritional restrictions may contribute to numerous deficiencies, which makes it very difficult to balance this diet on your own. Patients following a low FODMAP diet should also bear in mind that the initial phase of the diet-the elimination phase-is a kind of diagnostic test as to whether a given patient will show sensitivity to FODMAPs. After the 2-6 week exclusion trial, the patient should be directed to gradually introduce products with different FODMAP content, observing the body's reaction to their presence in the diet. Unfortunately, numerous studies show that not every person with gastrointestinal diseases will respond positively to this form of therapy. Nonetheless, scientists place great hope in the low FODMAP method when it comes to alleviating persistent discomfort (*i.e.* bloating, constipation, abdominal pain), which can significantly reduce the comfort and quality of life. Further research into the long-term effects of low FODMAP diets is ongoing.

Keywords: FODMAP; Dietician; Symptoms; Constipation; Oligosaccharides

Introduction

Gastrointestinal disorders are an ever-growing problem among humans. Research is continually being conducted to learn about and attempt to treat these disorders. One of the ways of treating and alleviating these health problems is the introduction of a low FODMAP diet, *i.e.* a reduction in the amount of fermentable oligo and di and monosaccharides that are commonly present in certain amounts in food products. This diet is mainly used in SIBO (bacterial overgrowth of the large intestine) and IBS (Irritable Bowel Syndrome). Despite the proven effectiveness of low FODMAP diets, there is still not enough data and research on the effects of low FODMAP diets on these syndromes, and there are new questions and concerns that need to be investigated and clarified.

Low FODMAP positive effects of use and controversy and supporting materials that can help with diet

Many scientific papers describe the positive effects of using a Low FODMAP Diet (LFD). It is recommended in particular for patients with Irritable Bowel Syndrome (IBS), sometimes it is also used in SIBO and other inflammatory diseases. Most studies, however, focus on the use of LFD in IBS, where its effectiveness is documented [1-6].

The effect of the LFD diet is probably to reduce the supply of osmotically active and poorly absorbed short-chain carbohydrates to the intestine. This reduces the amount of water accumulated in the intestines and reduces the fermentation of the described carbohydrates and the resulting production of gases [7]. However, when it comes to the long-term effectiveness of LFD, there are still too few studies and data, and it is difficult to obtain funds for them.

Despite the positive effects of using low FODMAP diets, numerous controversies and risks result from dietary restrictions. The use of such a restrictive diet without consulting a specialist in dietetics or a gastroenterologist, also correctly prepared, threatens the emergence of nutritional deficiencies and abnormalities in the functioning of the gastrointestinal tract. In addition, limiting FODMAPs may reduce the number of natural substrates for the intestinal microbiota such as fructooligosaccharides and galactooligosaccharides, which may negatively impact it and this, may translate into a reduction in the synthesis of short-chain fatty acids. SCFAs have important protective and trophic activity for colonocytes [8,9].

Another negative aspect of using LFD is the difficulty in the maintenance of this diet. This is related to the higher cost and the bland and unsatisfactory taste of the dishes described by patients. In addition, restaurants and other eateries rarely serve LFD-compliant dishes.

Many initiatives support people using the low FODMAP diet, including various applications for phones, e.g. an application from the Australian Monash University and an increasingly extensive literature with dietary recommendations. Many scientists are constantly working on introducing new recommendations and facilitations for the LFD diet with hope for a better future.

Literature Review

Irritable bowel syndrome

Irritable Bowel Syndrome (IBS) is one of the most diagnosed gastrointestinal disorders. It is characterized by abdominal pain without any organic pathology. It has non-specific symptoms and prevalence depends on communities. IBS has been categorized into four subtypes:

- Diarrhea (IBS-D).
- Constipation (IBS-C).
- Mix-diarrhea and constipation (IBS-M).
- Undefined predominant stool form (IBS-U).

It is believed that symptoms are a result of complex interactions between biological, psychological and social factors.

Rome IV criteria define IBS as: Recurrent abdominal pain or discomfort at least 1 day per week in the last 3 months, associated with two or more of the following criteria:

- Related to defecation.
- Associated with a change in frequency of stool.
- Associated with a change in form or appearance of stool.

Currently considered the most effective treatment method is a well-balanced diet, especially one based on low FODMAP. Still, there were also several therapeutic modalities, including antispasmodics meds, laxatives, antidepressants, antibiotics, and behavioral therapy [10].

Low FODMAP in the treatment of IBS

It's estimated that two-thirds of IBS patients have IBS symptoms because of some triggering foods. For this reason, scientists and doctors recommend elimination diets. Recently, the FODMAP diet has gained colossal interest.

FODMAPs are short-chain carbohydrates, lowly absorbed in the small bowel and highly fermentable by gut flora. This diet contains fructose monosaccharides, lactose disaccharides, oligosaccharides fructan and galactan, polyols like sorbitol, mannitol, xylitol and maltitol. This diet is used because FODMAPs increase the delivery of readily fermentable substrates and water to the distal small intestine and colon. It results in distension of the intestinal lumen and gases. The low FODMAPs diet may improve functional gastrointestinal symptoms [11].

Currently, we can find numerous tables comparing products with low and high FODMAP content (Table 1) [12].

FODMAP type	High-FODMAP foods	Alternative low-FODMAP foods
Oligosaccharides (fructans/galact-oligosaccharides)	**Vegetables:** Artichokes, asparagus, beets, brussels sprouts, broccoli, cabbage, fennel, garlic, leeks, okra, onions, peas, shallots.	Bamboo shoots, bell peppers, bok choy, carrots, celery, chard, chayote, chives, choy sum, corn, eggplant, green beans, lettuce, parsnips, pumpkins, spring onions (green part only), tomatoes; onion and garlic substitutes: Garlic-infused oil.
	Fruits: Watermelon, apple, white peaches, persimmon.	Bananas, blueberries, cantaloupes, carambola, durian, grapefruit, grapes, honeydew melon, kiwi, lemons, limes, mandarin, oranges, passion fruit, pawpaw, raspberries, strawberries, tangelos.
	Wheat and rye when eaten in large amounts (e.g., bread, pasta, couscous, cookies, crackers, biscuits).	Gluten-free and spelt bread and cereal products.
	Legumes: Chickpeas, lentils, kidney beans, baked beans, soy beans.	Canned chickpeas.
Disaccharides (lactose)	Milk (cow, goat, sheep), yogurt, soft cheeses, custard, ice cream.	Lactose-free milk and yogurt, rice milk, hard cheeses, butter,ice cream substitutes such as gelato and sorbet.
Monosaccharides (fructose)	**Fruits:** Apples, Asian pears, pears, clingstone peaches, mango, sugar snap peas, watermelon, canned fruit in natural juice; large total fructose dose: Concentrated fruit sources; large servings of fruit, dried fruit, fruit juice.	As listed above.
	Honey	Maple syrup, golden syrup.
	Sweeteners: Fructose, high fructose corn syrup.	**Sweeteners:** Any except polyols.
Polyols	**Vegetables**: Avocados, cauliflower, mushrooms, snow peas, sweet corn	As listed above
	Fruits: Apples, apricots, Asian pears, cherries, longon, lychee, nectarines, peaches, pears, plums, prunes, watermelon.	As listed above
	Sweeteners: Isomalt, maltitol, mannitol, sorbitol, xylitol	Sucrose, glucose

Table 1: Foods with high-FODMAP content, and low-FODMAP alternatives.

Table 1: Foods with high-FODMAP content, and low-FODMAP alternatives.

In one randomized trial, Halmos, et al. from Monash University, compared gastrointestinal symptoms in IBS patients on a low-FODMAP diet with patients on a regular moderate-FODMAP diet (typical Australian diet) and healthy controls. Proved that patients with IBS had lower overall gastrointestinal symptom scores thanks to the FODMAP diet *vs.* IBS patients on a regular Australian diet. Flatulence and abdominal pain were also reduced in patients on a low FODMAP diet [13].

Another study undertook to consider the severity of IBS symptoms with fructose and fructan consumption using the MRI method. In a randomized, double-blind, crossover study, 16 healthy volunteers took part. The gastrointestinal tract was assessed after carbohydrate provocation. Participants consumed 500 ml of water containing 40 g glucose, fructose, or inulin or a combination of 40 g fructose and 40 g glucose. MRI scans were performed every hour for 5 hours to assess gastric content, small intestinal water content and colonic gas. After each scan, hydrogen in exhaled air was measured and of course, symptoms were noted.

Fructose increases the water content of the small intestine (dilated the small intestine). The combination of glucose and fructose reduced the effect of fructose on the intestine. On the other hand, glucose and inulin alone had no significant effect on a small intestinal water content. Still, they led to the greatest gas production in the colon, also producing the most hydrogen in exhaled air. Glucose did not affect exhaled hydrogen content, but adding fructose to glucose significantly reduced the concentration measured against fructose.

This study showed that FODMAPs had a significant effect on gas production. The study authors inferred that long-chain carbohydrates (inulin) had a greater effect on gas production in the colon, but little effect on the water content in the small intestine. Small-chain FODMAPs (fructose) can cause distension of the intestinal lumen. In addition, a combination of equal amounts of glucose and fructose has been shown to reduce fructose malabsorption in the small intestine and reduce the effect of fructose on the water content of the small intestine and the hydrogen concentration in the exhaled air [14].

Before starting a low FODMAP diet, the patient should be questioned about their food and dietary preferences also a detailed dietary history should be collected. The diet should be implemented in two phases:

Initial phase: Strict elimination of products rich in FODMAP (6-8 weeks). During this period the symptoms should be evaluated: If they are alleviated, if not-it is necessary to evaluate the patient's compliance; if so, it is possible to proceed to the second phase.

Phase two: The gradual introduction of products, close monitoring of symptoms.

An article compares three diets (including a low FODMAP diet) and their effects on symptoms in patients with IBS [15].

Firstly, the low FODMAP diet increased stool constancy. This value based on the Bristol scale was 4, considered normal.

Secondly, a decrease in bloating and abdominal pain after a low FODMAP diet was proven in the studies performed.

Patients were confirmed to have an improved quality of life, both physical and psychological.

The effect of hypnotherapy and yoga on IBS patients

These two methods and other relaxation techniques in IBS patients are still being intensively researched. Nevertheless, we can already come across many publications/results that describe the response of people with IBS to these techniques.

In one randomized study, 59 IBS patients were divided into two groups to compare the effects of yoga (two sessions per week–first group) and a low-FODMAP diet (three dietary counseling sessions in total) [16]. The intention was to assess the effect of these methods on the change in gastrointestinal symptoms, changes in quality of life, perceived stress, and health. It was shown that a reduction in IBS-SSS was observed in both groups, which empowered the researchers to conclude that IBS patients may benefit from low-FODMAP and regular yoga practice.

Another study undertook the impact of evaluating hypnotherapy in patients with IBS [17]. As many as 71% of patients responded to the applied hypnotherapy at the outset. 81% maintained the improvement over a longer period, while the remaining 19% claimed to have observed only a slight worsening of symptoms. It has been proven that the beneficial effects of hypnotherapy in IBS patients seem to last for at least five tears, so this method should be considered a therapeutic option for IBS patients.

There have been numerous advances in the way symptoms are alleviated in patients with IBS. Several studies are accumulating evidence demonstrating the effectiveness of low-FODMAP diets for controlling gastrointestinal symptoms in IBS patients. Due to its high restrictiveness, it is important to introduce certain foods/alternate the diet over time to suit the individual needs and requirements of the patient. Regular monitoring of symptoms is essential. Despite the huge publicity of the low-FODMAP diet and its great benefits, further clinical research is needed to assess, among other things, the effect of this diet on the intestinal microflora or to determine its nutritional adequacy.

GERD, functional dyspepsia, heartburn

Functional dyspepsia: Functional Dyspepsia (FD) is, next to Irritable Bowel Syndrome (IBS), one of the most common functional gastrointestinal disorders. It affects more than 15% of the entire human population. Currently, the Rome criteria IV are crucial in its diagnosis. They divide FD into two subgroups-the first is characterized by the appearance of dyspeptic symptoms after a meal (postprandial disorder syndrome). In contrast, the second is characterized by the appearance of symptoms regardless of the consumed meal (painful epigastric syndrome). Unfortunately, currently there are no clear and reliable biomarkers of FD, and additional difficulty in its diagnosis is the overlap of symptoms of both FD and other numerous gastrointestinal disorders, including Irritable Bowel Syndrome (IBS) [18].

Rome IV criteria and defining dyspepsia: Helpful in defining functional dyspepsia is analyzing whether the patient has at least one or more of the symptoms included in the Rome IV criteria. These include:

- A bothersome feeling of fullness after a meal.
- A feeling of early satiety.
- Difficult epigastric pain.
- Burning epigastric pain when no structural abdominal disease has been identified.

These symptoms must have occurred at least 3 days per week during the past 3 months. Additionally, they must be chronic, meaning they began at least 6 months before the diagnosis was made.

Treatment: Indeed, early diagnosis and treatment can significantly improve quality of life, but at present, it has very low efficacy compared to placebo. In addition, all cases of FD cannot be effectively treated in the same way, and treatment methods do not involve changes to the patient's diet. Nevertheless, many patients associate their FD symptoms with their meals, and the similarity of these symptoms to IBS has led them to test the FODMAP diet as a form of dyspepsia treatment [19].

Dyspepsia and FODMAPs: Several studies have shown that dyspepsia is associated with the consumption of cereal products, pasta, wheat, and sodas, fruits, fruit juices, milk, and highly processed foods. In addition, a low-FODMAP diet has been confirmed to significantly reduce IBS symptoms, but its effect on relieving dyspeptic symptoms has not been established [20].

Heartburn and FODMAPs: The effect of a low-FODMAP diet was tested in two studies, but the results were completely different. One confirmed the effect of the low-FODMAP diet on heartburn severity. In another, the heartburn scores of subjects on the low-FODMAP diet were not significantly different from those on the high-FODMAP diet. However, a significant relief of heartburn severity was confirmed in IBS sufferers on a concurrent low-FODMAP diet [21].

Discussion

GERD and IBS

The most common Gastroesophageal Reflux Disease (GERD) symptoms are burning, discomfort in the stomach and throat, nausea, vomiting, coughing and belching, chest pain, difficulty swallowing, or laryngitis.

Co-occurrence of GERD with IBS is also a fairly common problem. While the former affects the upper gastrointestinal tract, the latter is associated with impaired functioning of its lower part. Their coexistence additionally aggravates gastrointestinal symptoms.

Gas accumulated in the intestines due to incomplete digestion and subsequent fermentation of FODMAPs may cause bloating and gastric pressure, which directly translates to increased GERD symptoms such as nausea, belching and heartburn.

Gas buildup (e.g., due to SIBO) and pressure caused by chronic constipation, although indirect, can also exacerbate GERD symptoms.

Delayed gastric motility, in turn, affects both the upper and lower gastrointestinal tract as it lodges in the intestines and exacerbates IBS and GERD symptoms.

GERD and FODMAP

Statistics show that approximately 33% of patients treated with Proton Pump Inhibitors (PPIs) who suffer from GERD continue to experience reflux symptoms despite treatment. In this type of patients there are currently not many methods allowing to improve their quality of life. The best known and easiest way to alleviate symptoms is a modified diet.

One randomized trial published in neurogastroenterology and motility compared the efficacy of a 4-week low-FODMAPs diet and usual dietary recommendations (such as a low-fat diet, head elevation while lying down) in patients with PPI-resistant GERD. The results clearly showed that introducing the low-FODMAPs diet did not reduce reflux complaints any more than the usual dietary recommendations, and both approaches showed very similar effects. In conclusion, the low-FODMAPs diet can only be recommended for GERD sufferers who have also been diagnosed with IBS [22].

SIBO

SIBO, or small intestinal bacterial overgrowth syndrome, is a disease entity characterized by excessive growth of bacterial flora typical for the large intestine in the jejunum. In physiological conditions there are protective mechanisms against excessive growth of bacterial flora such as gastric acid or motor activity of small intestine. When these mechanisms fail, increased bacterial growth in the small intestine and associated symptoms may occur. Clinical signs of the disease include abdominal pain, bloating, and chronic diarrhea. Disturbed fat absorption may also contribute to weight loss. Damage to the enterocyte mucosa and increased consumption of vitamins, minerals, or nutrients by bacteria can cause severe deficiencies, while increased bacterial activity can result in a strong increase in vitamin K and folate. Diagnosis of SIBO includes a hydrogen breath test or obtaining a culture from the jejunum during upper endoscopy. Primary treatment includes antibiotic therapy and possible alleviation of deficiencies resulting from the disease [23].

The mainstay of SIBO treatment is the use of antimicrobials, which should not aim to eradicate the entire bacterial flora, but rather to modify the gut microecology to alleviate symptoms. The most commonly prescribed antibiotic for the treatment of SIBO is rifaximine (trade name is Xifaxan). A meta-analysis by Gatta, et al. showed rifaximinie to be about 70% effective in treating SIBO in over 1200 patients. Rifaximine is actually an eubiotic that does not destroy the bacterial flora of the colon and has a number of other positive effects. However, it is rare that xifaxan alone is enough. Usually other antibiotics are included, depending on symptoms, test results and other accompanying health conditions. The therapy should also include appropriate herbs, and sometimes antifungal drugs. The small intestine can also overgrow fungus, in which case we deal with SIFO-Small Intestinal Fungal Overgrowth. In addition, one of the most important elements of therapy is a substance that will stimulate the MMC (Migrating Motor Complex) to work, *i.e.* a prokinetic [24,25].

Increasingly, patients are being encouraged to use alternative treatments at the same time (mainly in cases resistant to antibiotic treatment) such as probiotics, herbal medicines or therapeutic diets [26]. Two studies showed a significant improvement in the symptoms present (a reduction in symptoms) with the use of probiotics. However, probiotics did not appear to be effective in preventing SIBO [27]. Studies have shown that herbal therapies are at least as effective as rifaximin in treating SIBO. Herbs appear to be as effective as triple antibiotic therapy in the rescue therapy of SIBO for those not responding to rifaximin [28].

The dominant dietary factor in the treatment of SIBO is the reduction of fermentable foods, and the most commonly recommended diets include the elemental diet and the FODMAP diet which is a diet that limits fermentable oligosaccharides, disaccharides, monosaccharides and polyols. The elemental diet has been shown to be highly effective in normalizing clinical symptoms of SIBO [29]. However, the information on the effect of the FODMAP diet on the course of SIBO is only an extension of the information on the effect of

this diet on IBS. Despite some uncertainties, the data confirm that a low FODMAP diet is associated with less fermentation products, as assessed by a breath test. In one study, daily hydrogen production was significantly higher after consumption of FODMAPS [30].

Nutritional therapies can help fight SIBO by reducing "bad" bacteria in the small intestine. The goal of such diet is to minimize foods that provide a breeding ground for the bacteria. For SIBO, the diet should be followed after antibiotic therapy (according to research, the bacteria are more susceptible to the antibiotic if you don't starve them). The most commonly recommended diet is the FODMAP diet. For people with intestinal problems such as SIBO or IBS, FODMAP-rich foods may contribute to increased discomfort. Due to the fact that they pass into the intestine unchanged and provide food for bacteria. The osmotic properties of these foods can cause increased water absorption in the small intestine. This can result in stretching of the intestinal wall and manifest as abdominal pain, a feeling of overflow, or diarrhea. It is important to note that short-chain carbohydrates are fermented by bacteria. The excessive number and activity of bacteria in people with SIBO leads to the production of excessive amounts of gas causing pain, discomfort, and bloating. It should be emphasized that in most cases of SIBO the diet should be very personalized. It must be based on the elimination, first of all, of the products that are the source of the ailment. This means that not every product given in the guidelines of low FODMAP diet or any other diet has to be strictly removed from the menu. Additionally, it is worth considering individualization of the diet based on food hypersensitivity testing. It has been proven that a diet low in FODMAPs is beneficial for IBS sufferers [31]. This may be due to reduced exposure of intestinal bacteria to short-chain carbohydrates and their fermentable products leading to reduced bacterial colony growth, osmotic transport of water into the intestinal lumen, and reduction of intestinal gas. The same process probably contributes to the reduction of discomfort in patients with SIBO, but at the moment there is no evidence to support this thesis [32]. However, the great hope of getting an answer to the nagging question regarding the effect of the FODMAP diet in the treatment of SIBO is the clinical trial that has begun.

Low FODMAP diet in the treatment of constipation induced by opioid treatment: Constipation in opioid analgesic therapy is a common side effect of the drugs administered (up to 40%), yet the awareness of healthcare professionals in this regard is rather residual. In recent years, there has been many research papers describing the pathogenesis and possible therapies to minimize the inconvenience of opioid use. The treatments that have been developed are associated with other side effects. A diet low in Fermentable Oligosaccharides, Disaccharides, Monosaccharides and Polyols (FODMAPs) is a factor in mitigating these side effects, which may prove crucial in improving the quality of life of people treated with opioids.

The duration of constipation is one of the parameters of Opioid-Induced Bowel Dysfunction (OIBD), and this term additionally takes into account: Pain, fatigue, stress, and bloating. According to the Bowel function index, constipation itself should not be less than 7 days [33].

Treatment methods for opioid-induced constipation: The primary prophylactic measure is to increase daily fiber intake (it is believed that increasing fiber intake alone may be insufficient and paradoxically conducive to the formation of faecal tumors). In addition, fluid intake and physical activity levels should be monitored. These recommendations for people struggling with severe pain, due to advanced cancer for example, are impossible to implement for obvious reasons. Consequently, the administration of stimulants, stool softeners and osmotic laxatives proves problematic. Another common method is to intervene with enemas and use manual maneuvers to assist defecation. It should be remembered that such methods are particularly difficult in the home setting where responsibility for the patient falls to the caregiver and these procedures can be painful and embarrassing for the patient [34].

The predominant action of opioids on the gastrointestinal tract is *via* mu receptors. For this reason, administration of specific Peripherally Acting Mu-Opioid Receptor Antagonists (PAMORA) is indicated. Drugs in this group include methylnaltrexone, alvimopan and naloxegol. Methylnaltrexone and alvimopan are early drugs and have not been approved for oral use in OIBD unlike naloxegol, which has received such approval. However, 14 days of treatment with macrogol and stimulants should elapse before starting therapy with PAMORA. This time, however, also depends on the patient's estimated life expectancy and should be shortened when this period is relatively short [35].

Use of a low FODMAP diet in therapy with naloxegol: The side effects of treatment with naloxegol are diarrhoea, abdominal pain and flatulence. Following a low FODMAP diet can help to offset these side effects. The mechanism of action of FODMAPs is mainly related to their osmotic activity, forcing water into the gastrointestinal tract. Moreover, once they enter the large intestine, they constitute a food easily absorbed by the intestinal microbiota, which ferments them and thus increases gas production. Limiting the intake of products with a high content of these can reduce gas production and thus eliminate the problem of bloating and abdominal pain.

The effect of a low FODMAP diet on stool consistency and the negative effect of this diet on constipation therapy with naloxegol may be of concern. A clinical study to verify the effects of a low FODMAP diet in treating patients with IBS found no effect on stool consistency. Thus, we exclude the possibility of a conflicting effect of this diet on the therapy of opioid-induced constipation.

The person ordering the low FODMAP diet in patients on opioid treatment should consider that it is a restrictive diet. Its use in patients with advanced cancer and short life expectancy may not be cost-effective given our primary goal of making patients' lives more comfortable.

Conclusion

The low-FODMAP diet may bring satisfactory results in the treatment of IBS, SIBO and most likely also in other conditions where our goal is to control gastrointestinal symptoms. Patients treated with opioids may also benefit from following the rules of this diet. It should be remembered, however, that this diet is still the subject of research and answers to medically important questions are still being sought. We do not know how this diet affects the intestinal microflora, and it is even difficult for us to determine its nutritional adequacy. Nevertheless, the beneficial effect of the low-FODMAP diet on the comfort of life of specific patients is noticeable. It does not solve all our problems, but it may help with some of them. However, we should remember that it is a restrictive diet, which may further limit the potential number of groups where it is useful. After all, we want to bring relief to people suffering from IBS, SIBO or cancer patients struggling with constipation caused by opioid therapy, not another difficulty in their lives. Hopefully, future studies will show us other uses for the low-FODMAP diet and it can be used on a larger scale.

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