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The Low FODMAP Diet in Irritable Bowel Syndrome: Current State of Knowledge and Therapeutic Perspectives

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Abstract:
Irritable bowel syndrome (IBS) is a chronic functional gastrointestinal disorder that significantly reduces patients' quality of life. One of the primary therapeutic approaches is the low FODMAP diet, which involves the restriction of fermentable oligo-, di-, monosaccharides, and polyols. The aim of this review is to summarize the current knowledge regarding the

effectiveness of this diet in alleviating IBS symptoms, its impact on the gut microbiota, and its long-term health consequences.
Research findings confirm that the low FODMAP diet effectively reduces symptoms, particularly in patients with diarrhea-predominant IBS (IBS-D), although long-term adherence may lead to a reduction in beneficial gut bacteria. Adherence challenges and the lack of clear guidelines on FODMAP reintroduction represent significant clinical issues. Alternative strategies, such as the Mediterranean diet, may help mitigate the negative effects of FODMAP elimination. The low FODMAP diet also shows potential in children and patients with inflammatory bowel disease (IBD), although further studies are needed. In the future, it will be essential to develop support strategies for patients and to personalize dietary recommendations, which may contribute to sustained improvements in the quality of life for individuals with IBS.

Keywords: irritable bowel syndrome, IBS, low FODMAP diet, gut microbiota, dietary therapy, Mediterranean diet, FODMAP reintroduction.

Introduction

Irritable bowel syndrome (IBS)

Irritable bowel syndrome (IBS) is a chronic functional gastrointestinal disorder characterized by recurrent abdominal pain, bloating, and alterations in bowel habits, without detectable organic or biochemical abnormalities. This condition affects a significant portion of the population and is more commonly observed in women than in men. IBS has a considerable impact on patients' quality of life, often limiting daily activities and increasing the burden on healthcare systems.
It is estimated that IBS affects approximately 5–10% of the general population, making it one of the most prevalent gastrointestinal disorders worldwide. Due to the heterogeneous nature of symptoms and their fluctuating severity, diagnosing and treating IBS remains a substantial challenge both diagnostically and therapeutically. Several subtypes of IBS are recognized—namely, diarrhea-predominant (IBS-D), constipation-predominant (IBS-C), mixed type (IBS-M), and unclassified (IBS-U)—each requiring an individualized therapeutic approach.
Despite numerous studies on the pathogenesis of IBS, its etiology remains incompletely understood. Current evidence suggests that disruptions in the gut-brain axis, visceral hypersensitivity, alterations in gut microbiota composition, and psychological factors such as chronic stress play key roles in its development. Gastrointestinal motility disorders and increased intestinal permeability are also important contributors. These factors collectively lead to characteristic symptoms such as diarrhea, constipation, or their alternation, significantly hindering patients' daily functioning.

The Low FODMAP Diet as a Therapeutic Strategy

An increasing body of evidence indicates a significant association between diet and the severity of IBS symptoms. Particular attention has been directed toward fermentable oligo-, di-, monosaccharides and polyols (FODMAPs), which exhibit high osmotic activity and are readily

fermented by gut bacteria. This group includes, among others, fructose, lactose, galacto-oligosaccharides, and polyhydric alcohols such as sorbitol, mannitol, and xylitol.

These compounds are poorly absorbed in the small intestine, leading to increased water retention and excessive gas production in the colon. In IBS patients, this results in symptoms such as abdominal pain, bloating, diarrhea, and constipation.

The low FODMAP diet, developed as a therapeutic intervention, involves three phases: initial elimination of FODMAP-rich foods, gradual reintroduction of individual groups, and final personalization of the diet based on the patient's individual tolerance. Numerous studies have shown that this diet significantly reduces IBS symptoms and improves patients' quality of life. As a result, the low FODMAP diet has been included in many clinical guidelines as a recommended non-pharmacological treatment approach for IBS.

Despite its effectiveness, the low FODMAP diet raises certain concerns, particularly regarding its impact on gut microbiota and the challenges associated with long-term dietary adherence. Alternative strategies, such as the Mediterranean diet, may offer valuable therapeutic benefits in IBS, especially when combined with the low FODMAP approach to minimize the negative consequences of eliminating fermentable carbohydrates.

In light of the above, a comprehensive and critical discussion of the current knowledge regarding the efficacy, safety, and practical implementation of the low FODMAP diet is necessary-one that also considers the needs of specific patient populations and the potential integration with other dietary models.

Objective of the Article

The aim of this article is to review the current evidence on the effectiveness of the low FODMAP diet in reducing symptoms of irritable bowel syndrome (IBS), with particular emphasis on its efficacy across different IBS subtypes and its impact on patients' quality of life. The analysis includes the mechanisms of action of this dietary intervention and its long-term health consequences, including its effects on the gut microbiota. The article also discusses alternative dietary strategies, such as the Mediterranean diet, and their effectiveness compared to the low FODMAP approach. Since the available evidence on the efficacy of the low FODMAP diet in children and patients with inflammatory bowel disease (IBD) is limited, relevant studies concerning these patient groups have also been reviewed.

Additionally, the article focuses on the challenges associated with long-term adherence to the diet and its potential limitations, such as the risk of nutritional deficiencies and alterations in gut microbiota composition. Future research directions are presented, including the need for personalized dietary interventions and gradual FODMAP reintroduction strategies to optimize therapeutic outcomes.

It is hypothesized that the low FODMAP diet significantly reduces IBS symptoms in the short term, and its effectiveness may be enhanced through integration with other dietary models. Moreover, its impact on the gut microbiota may have clinical relevance, and the personalization of dietary recommendations may be a key element of successful intervention.

The collected data help identify areas requiring further investigation and provide a basis for developing more effective and individualized therapeutic strategies for IBS. The findings of this review may contribute to the update of practical dietary guidelines and the expansion of knowledge regarding the long-term safety of the low FODMAP diet.

Methods

This review included scientific articles published between 2020 and 2025, allowing for the incorporation of the most up-to-date evidence on the effectiveness of the low FODMAP diet in the treatment of irritable bowel syndrome (IBS). A literature search was conducted in January and February 2025 using the PubMed database, with inclusion limited to peer-reviewed publications available in English. Inclusion criteria encompassed studies involving patients diagnosed with IBS and assessing the effectiveness of the low FODMAP diet. Studies that lacked complete clinical data, were not peer-reviewed, or focused on dietary interventions unrelated to the low FODMAP diet were excluded.

The selection process was conducted in several stages: first, publications were identified based on keywords such as "low FODMAP diet," "irritable bowel syndrome," "IBS," "gut microbiota," and "long-term adherence." Chronological filters (2020–2025), language filters (English), and quality filters (peer-reviewed scientific articles) were then applied. In the case of duplicates or studies with similar topics, preference was given to those with larger sample sizes or more recent data.

The analyzed materials encompassed various types of studies, including randomized controlled trials (RCTs), systematic reviews and meta-analyses, cohort studies, narrative reviews, and one clinical trial protocol. Narrative reviews primarily served a descriptive function, whereas cohort studies provided long-term observational data. The inclusion of meta-analyses and RCTs enabled an assessment of the low FODMAP diet's effectiveness based on the highest level of evidence, consistent with the hierarchy of Evidence-Based Medicine (EBM).

The gathered material served as an empirical foundation for qualitative comparative analysis. A synthesis of study findings was performed regarding the efficacy of the low FODMAP diet in different IBS subtypes, its impact on gut microbiota, long-term adherence, and potential application in children and patients with inflammatory bowel disease (IBD). Key aspects of the review included comparing study outcomes, identifying dominant trends, and critically analyzing the limitations of the current state of knowledge.

Results

Effectiveness of the Low FODMAP Diet in Reducing IBS Symptoms

The low FODMAP diet is one of the most well-documented dietary strategies used in the treatment of IBS, particularly in patients with diarrhea-predominant irritable bowel syndrome (IBS-D). A meta-analysis conducted by Black et al. (2021) demonstrated that adherence to the low FODMAP diet resulted in a significant reduction in overall IBS symptoms compared to a standard diet (RR 0.67; 95% CI 0.48–0.91). Similar findings were reported in the study by

Wang et al. (2021), in which the low FODMAP diet improved stool consistency and reduced the frequency of bowel movements—an especially important outcome for patients with IBS-D. Other studies have shown that following the low FODMAP diet contributes to the alleviation of abdominal pain and a reduction in bloating. The study by Algera et al. (2022) revealed a significant decrease in the severity of gastrointestinal symptoms ($P = 0.04$) and an improvement in bowel movement regularity among patients adhering to this dietary approach. However, it is important to note that although the diet effectively reduces IBS symptoms, its outcomes may vary depending on individual tolerance and adherence to the dietary protocol.

A study conducted by Morariu et al. (2023) found that the effectiveness of the low FODMAP diet may be comparable in both children and adults; however, further research is needed in this area. Their review suggests that the diet effectively reduces gastrointestinal symptoms-such as abdominal pain, bloating, and a sense of discomfort-resulting in improved quality of life across different age groups. The authors caution, however, that implementing the diet in pediatric populations may carry a risk of nutritional deficiencies, thus requiring close dietary supervision and further long-term observational studies. Additionally, in the analysis by Xie et al. (2022), it was emphasized that the effectiveness of this diet may be significantly influenced by baseline symptom severity and the presence of comorbid dysfunctions of the gut-brain axis.

Furthermore, Khan et al. (2025) observed that the low FODMAP diet may bring rapid improvement within just a few weeks of initiation, underscoring its potential as a therapeutic tool in the short-term management of IBS symptoms. Their meta-analysis highlighted the particular effectiveness of the intervention in reducing abdominal pain, bloating, and bowel movement frequency, especially in patients with IBS-D. However, they also noted that the diet's impact on patients' quality of life, while improved, was not statistically significant across all included studies. Meanwhile, Zhang et al. (2025) demonstrated that the effectiveness of the intervention can be further enhanced through individualized dietary planning and comprehensive patient education.

Long-Term Effectiveness and Dietary Adherence

Studies on the long-term effectiveness of the low FODMAP diet suggest that although its implementation may bring lasting benefits, adherence to dietary restrictions remains a significant challenge for patients. Bellini et al. (2020) demonstrated that both during the initial phase and after 6 to 24 months of adherence, the diet continued to alleviate IBS symptoms and improve patients' quality of life. Importantly, no negative impact on patients' nutritional status was observed; however, participants reported difficulties with long-term acceptability of the diet. The authors also emphasized that sustained adherence requires not only patient motivation but also conscious dietary management supported by a qualified dietitian. During the course of the intervention, patients gradually shifted their perception of "problematic" foods, which may indicate the adaptive role of the diet in shaping healthier eating habits.

Additionally, Jayasinghe et al. (2024) highlighted that implementation of the low FODMAP diet requires careful monitoring and regular consultations to avoid potential side effects such as nutritional deficiencies or adverse changes in the gut microbiota. They also stressed that

therapeutic effectiveness depends on consistent follow-up and professional dietary support. Similarly, So et al. (2022) noted that many patients require a structured support program, encompassing both education and ongoing monitoring of dietary adaptation over time.

Impact of the Low FODMAP Diet on Gut Microbiota

One of the most controversial aspects of the low FODMAP diet is its impact on gut microbiota. Numerous studies indicate that the restriction of fermentable carbohydrates leads to a reduction in beneficial gut bacteria, which may have long-term health consequences.

A meta-analysis conducted by So et al. (2022) demonstrated that following a low FODMAP diet reduces the abundance of beneficial Bifidobacteria, which may influence the functioning of the gut-brain axis and the metabolism of short-chain fatty acids (SCFAs), which play a key role in maintaining gastrointestinal health. Furthermore, no significant changes were observed in total SCFA concentrations or stool pH, suggesting relative stability of other microbiological parameters.

Similar results were obtained in the study by Zhang et al. (2025), in which long-term adherence to the low FODMAP diet led to a decrease in gut microbiota diversity, potentially affecting digestive system health. Likewise, in their study, Khan et al. (2025) noted that the elimination of fermentable carbohydrates reduces gas production and alleviates IBS symptoms, but may also contribute to imbalances in the gut microbiota.

The study by Xie et al. (2022) showed that the addition of probiotics to the low FODMAP diet may reduce the adverse effects of carbohydrate restriction while simultaneously improving gut microbiota function. In particular, strains of *Lactobacillus* and *Bifidobacterium* demonstrated the highest efficacy in improving microbial balance and alleviating IBS symptoms, indicating their therapeutic potential in supporting restrictive elimination diets. The authors also emphasized that supplementation with these probiotics may help restore Bifidobacterium populations after the elimination phase. Additional analysis also revealed high efficacy of *Bacillus*, although its long-term impact on the microbiota requires further investigation. Moreover, probiotic supplementation has been shown to restore Bifidobacterium levels to baseline, which is essential for maintaining microbiological homeostasis.

Comparison of the Low FODMAP Diet with Other Dietary Strategies

Some studies suggest that other dietary approaches may be similarly effective in managing IBS. Mentella et al. (2020) analyzed the impact of various dietary patterns on the gut microbiota and disease progression, highlighting that there is no single universal diet effective for all patients. The authors emphasized the potential benefits of different dietary strategies, such as the specific carbohydrate diet, gluten-free diet, and anti-inflammatory diet, which-similarly to the low FODMAP diet-may influence gut microbiota and alleviate symptoms in selected patient groups. An alternative approach to IBS therapy is the Mediterranean diet, which exhibits anti-inflammatory and prebiotic properties. The study by Kasti et al. (2024) suggests that combining the low FODMAP diet with the Mediterranean diet (MED-LFD) may offer additional

therapeutic benefits by minimizing the adverse effects of an elimination diet on gut microbiota. This study evaluates both clinical symptoms and microbiological parameters, such as SCFA levels and gut microbiota composition, allowing for a comprehensive assessment of the intervention's effectiveness. The authors hypothesize that combining the eliminative nature of the LFD with the prebiotic qualities of the Mediterranean diet may lead to better microbial balance and improved quality of life for patients. Importantly, the MED-LFD intervention could also serve as a realistic alternative to costly pharmacotherapy, supporting long-term symptom management in IBS. Positive outcomes from this study may form the basis for implementing more complex yet better-tolerated dietary strategies in everyday clinical practice.

Low FODMAP Diet in Children and Patients with Inflammatory Bowel Disease (IBD)

Some studies indicate that the low FODMAP diet may also be effective in children with IBS. In a randomized trial by Dogan et al. (2020), the effectiveness of the diet was evaluated in 60 children aged 6–18 years. After two months of intervention, abdominal pain intensity was significantly lower in the low FODMAP group (3.80±1.10) compared to the control group (2.03±1.03). After four months, pain levels increased, but remained lower in the intervention group (2.97±1.10 vs. 1.63±0.71). Additionally, clinical improvement assessed by the CGI-I scale favored the low FODMAP diet. These results suggest potential effectiveness of the diet in children, though further studies are needed to assess treatment duration and safety.

Moreover, the low FODMAP diet has been tested in patients with inflammatory bowel disease (IBD) who present IBS-like symptoms. Wiecek et al. (2022) demonstrated that the diet significantly alleviated IBS symptoms in IBD patients, regardless of the presence of small intestinal bacterial overgrowth (SIBO). However, research by Grammatikopoulou et al. (2020) suggests that available evidence of efficacy in this population is limited and may be confounded by placebo effects.

The study by Bertin et al. (2024) emphasized potential limitations of the low FODMAP diet in IBD patients, particularly due to its effects on protein metabolism and gut microbiota. The authors noted that carbohydrate elimination may alter microbial composition and enzymatic activity, potentially disrupting protein digestion and absorption. Reduced availability of certain fermentable substrates may also impact the production of short-chain fatty acids, which are crucial for maintaining mucosal integrity. Therefore, the use of the low FODMAP diet in IBD patients should be approached cautiously and preceded by individual risk assessment and metabolic monitoring.

Potential Limitations and Controversies

Despite the high effectiveness of the low FODMAP diet, certain limitations affect its clinical use. Bertin et al. (2024) emphasized that long-term adherence may lead to nutrient deficiencies and adverse changes in gut microbiota, which may necessitate supplementation and ongoing supervision by healthcare professionals.

Additionally, Nikolaki et al. (2023) reported that the diet may influence protein metabolism in the gut, with both potentially beneficial and harmful health effects. The restriction of fermentable carbohydrates may increase protein fermentation, resulting in the production of branched-chain fatty acids (BCFAs) and other metabolites such as amines, hydrogen sulfide, and phenols. While some of these compounds may exert protective effects, others can damage the intestinal epithelium and exacerbate inflammation. Therefore, further research is needed to evaluate their role in IBS pathophysiology. Spiller (2021) highlighted the need for individualized dietary plans, noting that eliminating certain foods may not be necessary for all patients.

Discussion

The low FODMAP diet is one of the most frequently used and best-documented dietary strategies in the management of irritable bowel syndrome (IBS), particularly in patients with diarrhea-predominant IBS (IBS-D). Research findings confirm its effectiveness in reducing IBS symptoms; however, its long-term implementation raises certain concerns, and its full range of health consequences has not yet been conclusively determined. Key issues relate to patient adherence, the impact on gut microbiota, and the potential to integrate this diet with other nutritional models to enhance its efficacy and reduce potential adverse effects. Compared to earlier dietary strategies, the low FODMAP diet represents a significant therapeutic advancement, particularly as it is grounded in the pathophysiology of IBS.

One of the primary challenges in implementing the low FODMAP diet lies in long-term adherence. The restrictive nature of the initial elimination phase demands significant changes in eating habits, which many patients find difficult to sustain. Furthermore, the lack of clear guidelines regarding optimal FODMAP reintroduction strategies can result in incomplete or inappropriate dietary expansion, increasing the risk of symptom recurrence. Evidence suggests that patients who receive professional dietary support achieve better therapeutic outcomes and demonstrate greater adherence to long-term dietary recommendations. Therefore, in clinical practice, it is crucial to develop effective patient support strategies that include both dietary education and tools for monitoring compliance and adjusting the diet to individual needs.

Another major area of concern is the diet's impact on gut microbiota. While limiting fermentable carbohydrates effectively alleviates IBS symptoms, it may also lead to a reduction in beneficial bacterial populations, particularly Bifidobacteria, which play a critical role in maintaining intestinal homeostasis and the metabolism of short-chain fatty acids (SCFAs). There are legitimate concerns that long-term reductions in SCFA production could compromise gut barrier function and negatively influence the gut–brain axis. To date, available studies provide limited data on the persistence of such changes and their overall health implications. In this context, combining the low FODMAP diet with other dietary models that support the gut

microbiota while maintaining symptom control is increasingly being considered. The Mediterranean diet, in particular, has attracted interest due to its richness in polyphenols, fiber, and healthy fats, which have prebiotic and anti-inflammatory properties. The combination of both dietary strategies could offer an optimal therapeutic model, minimizing the adverse effects of carbohydrate elimination while supporting the function of a healthy gut microbiota. It may be worth considering whether the low FODMAP diet should be regarded primarily as a short-term tool for managing IBS flare-ups, rather than as a long-term dietary strategy.

The use of the low FODMAP diet in other patient populations, such as pediatric patients and individuals with inflammatory bowel disease (IBD), remains insufficiently clarified. Current evidence suggests that the diet may be beneficial in these groups as well, yet there is a lack of definitive scientific data to support clear clinical recommendations. In children, a major concern is the potential impact of long-term elimination diets on growth and development, which necessitates careful evaluation in terms of nutritional adequacy and deficiency risks.

In IBD patients, where IBS coexists as an additional factor impairing quality of life, it remains unclear whether the low FODMAP diet should be part of the therapeutic strategy or whether its prolonged use might result in undesirable alterations in gut microbiota and influence the course of the underlying disease. High-quality clinical trials are needed to assess the safety and efficacy of this approach in these specific populations.

One of the main limitations of the current body of research on the low FODMAP diet is the relatively short duration of most studies. The majority focus on short-term efficacy, which hinders the assessment of long-term health outcomes. It remains uncertain whether prolonged use of the diet leads to negative metabolic consequences, including disruptions in microbiota composition and potential nutrient deficiencies. Its impact on the gut–brain axis, as well as possible immunological implications, also remains underexplored. An additional issue is the considerable methodological heterogeneity across studies, stemming from differences in intervention duration, symptom assessment tools, and levels of dietary adherence. Moreover, there is a lack of clearly defined guidelines on the optimal FODMAP reintroduction strategy, which poses a significant challenge in clinical practice and may lead to individualized implementation errors. Identifying biomarkers that predict positive response to the diet could significantly enhance the effectiveness of treatment.

In the authors' opinion, the low FODMAP diet should be considered part of a more comprehensive dietary approach rather than the sole recommendation for IBS patients. A combined strategy that incorporates the Mediterranean diet or adjunctive probiotic therapy may offer more balanced therapeutic outcomes. There is a notable lack of studies evaluating the efficacy of such alternative dietary approaches. Future research should focus on the long-term effects of the low FODMAP diet, particularly its impact on gut microbiota and nutrient metabolism. Longitudinal cohort studies and well-designed randomized controlled trials are essential to determine whether microbiota changes are reversible, to elucidate mechanisms underlying sustained efficacy, and to identify methods for minimizing potential adverse effects

of the diet. Furthermore, the development of more precise guidelines for FODMAP reintroduction is critical in order to reduce the risk of symptom relapse and facilitate long-term dietary adherence. The authors also emphasize the need for greater personalization of dietary therapy, accounting for individual differences in gut microbiota composition, genetic factors, and psychosocial variables that affect adherence. A personalized approach may become a cornerstone of future nutritional therapy in IBS.

Conclusions

In summary, the low FODMAP diet remains one of the most effective therapeutic strategies in the management of irritable bowel syndrome (IBS), providing significant symptom relief and improving patients' quality of life. However, its long-term health consequences-particularly regarding the gut microbiota and the potential for nutritional deficiencies-require further investigation.

Personalization of dietary therapy and individualization of the elimination and reintroduction phases of FODMAPs may enhance the effectiveness of treatment.

Combining the low FODMAP diet with other dietary strategies, such as the Mediterranean diet, may help minimize the adverse effects associated with the elimination of fermentable carbohydrates and improve gut microbiota composition.

Future research should focus on assessing the long-term impact of the low FODMAP diet, developing effective strategies to support patient adherence, and identifying optimal methods for reintroducing FODMAP-rich foods. It is also essential to analyze the diet's effects across diverse patient groups, including children and individuals with inflammatory bowel disease (IBD). Implementing a personalized approach and considering integration with other nutritional models may contribute to optimizing therapeutic outcomes in the treatment of IBS.

Disclosure

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