

Clinical Efficacy and Implementation of the Low-FODMAP Diet in Irritable Bowel Syndrome: A Systematic Review

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Abstract

Introduction: Functional gastrointestinal disorders, such as irritable bowel syndrome (IBS), significantly impair quality of life. The low-fermentable oligosaccharides, disaccharides, monosaccharides, and polyols (FODMAP) diet has emerged as an effective dietary intervention. This systematic review evaluates the evidence regarding its efficacy and clinical applicability in adults with functional gastrointestinal disorders. **Methodology:** A systematic review was conducted in accordance with the PRISMA 2020 guidelines and registered in PROSPERO (CRD1005339). Studies published between 2015 and 2025 were included if they evaluated the clinical effectiveness of the low-FODMAP diet compared with a standard diet or control group in adults with functional gastrointestinal disorders. Randomized controlled trials, cohort studies, and systematic reviews with meta-analyses were considered. Study selection, data extraction, and risk-of-bias assessment were independently performed by two reviewers using the Cochrane RoB 2.0 tool. **Results:** Of 1,750 records identified, 37 full-text articles were reviewed, and 22 studies were included in the final analysis. Findings demonstrated a significant reduction in gastrointestinal symptoms, improvements in quality of life, and adequate dietary adherence. **Conclusions:** The low-FODMAP diet is effective for symptom management in adults with irritable bowel syndrome. Its clinical implementation should be individualized and accompanied by professional supervision in order to optimize therapeutic outcomes.

Keywords

Irritable bowel syndrome, FODMAP diet, digestive signs and symptoms, quality of life, treatment adherence.

INTRODUCTION

Functional gastrointestinal disorders (FGIDs), including irritable bowel syndrome (IBS), affect a substantial proportion of the population and are associated with significant impairment in quality of life. These disorders are characterized by symptoms such as abdominal pain, bloating, flatulence, diarrhea, or constipation in the absence of demonstrable structural abnormalities. Globally, it is estimated that up to 40% of the population presents some form of FGID,

whereas the prevalence of IBS, according to the Rome IV criteria, is 3.8%^(1,2).

According to the global study conducted by the Rome Foundation across 33 countries and including more than 73,000 participants, 40.3% of individuals surveyed online and 20.7% of those surveyed through household interviews met criteria for at least one FGID, based on the Rome IV criteria. Regarding irritable bowel syndrome, prevalence was 4.1% in internet-based surveys and 1.5% in household surveys, with higher frequency observed in women⁽³⁾.

In Latin America, the prevalence of irritable bowel syndrome reaches 6.98%⁽⁴⁾. In Colombia, studies conducted in adult populations have reported figures as high as 24.0%⁽⁵⁾, suggesting a substantial national disease burden and potential regional variation associated with dietary, cultural, and diagnostic factors. The low-FODMAP diet (LFD) represents a non-pharmacological therapeutic strategy with demonstrated efficacy in reducing gastrointestinal symptoms. Its implementation consists of three phases: elimination, gradual reintroduction, and individualized adaptation, with the aim of achieving sustained symptom control⁽⁶⁾. FODMAPs are poorly absorbed carbohydrates that increase intestinal osmolarity and undergo colonic fermentation, leading to the production of gas and short-chain fatty acids. These pathophysiological mechanisms contribute to symptoms such as bloating, abdominal pain, and altered gastrointestinal motility. These effects support the use of the LFD as a therapeutic strategy for functional gastrointestinal disorders^(7,8).

Although the efficacy of the LFD is supported by scientific evidence, its clinical implementation continues to face challenges related to professional knowledge, food availability, and sociocultural factors. This underscores the need to address existing gaps and to develop evidence-based recommendations to optimize its application in the management of functional gastrointestinal disorders⁽⁹⁾.

In this context, the objective of the present systematic review is to synthesize the available scientific evidence on the efficacy and clinical applicability of the LFD in adult patients, with emphasis on symptom reduction, improvement in quality of life, and adherence to nutritional treatment.

MATERIALS AND METHODS

This systematic review was conducted in accordance with the PRISMA 2020 methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)⁽¹⁰⁾. The protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under ID 1005339. The review received approval from the Research Ethics Committee of the School of Medicine at Universidad Nacional de Colombia (B.FM.1.002-CE-042-25).

The search strategy was carried out on March 6, 2025, across the bibliographic databases PubMed, ScienceDirect, Scopus, SciELO, Embase (Elsevier), Latin American and Caribbean Health Sciences Literature (LILACS), and The Cochrane Library (CLIB), which includes the Cochrane Central Register of Controlled Trials (CENTRAL).

From an epidemiological perspective, studies meeting predefined eligibility criteria based on the PICO framework were included. The target population consisted of adults (≥ 18 years) diagnosed with functional gastrointestinal

disorders, primarily irritable bowel syndrome or functional dyspepsia, according to the Rome III or Rome IV criteria. The intervention evaluated was the LFD, applied in any of its phases, and compared with conventional diets, unstructured diets, or usual care without a specific dietary intervention. Outcomes included symptom reduction, improvement in quality of life, and treatment adherence. Both observational and experimental study designs were considered, including randomized controlled trials, cohort studies, case-control studies, and systematic reviews with meta-analysis. The search was limited to publications between 2015 and 2025 in English, Spanish, Portuguese, or French.

From a methodological perspective, studies involving populations not representative of the target clinical population were excluded. These included individuals younger than 18 years, frail older adults (≥ 70 years), and patients with organic gastrointestinal diseases such as inflammatory bowel disease, celiac disease, or cancer. Animal studies, in vitro research, and non-primary publications (narrative reviews, editorials, letters, case reports, and abstracts without complete data) were also excluded.

Studies that did not clearly describe the LFD implementation protocol, had follow-up periods shorter than four weeks, or failed to assess relevant clinical outcomes were excluded. Studies without defined comparator groups or those evaluating experimental diets different from conventional dietary approaches were also excluded. Only studies reporting clinically relevant outcomes, such as reduction in digestive symptoms, improvement in quality of life, or dietary adherence, were considered eligible.

The study screening process followed the methodological classification established by PROSPERO as “studies screened by one person (or machine) and verified by at least one other person (or machine),” ensuring independent double review to minimize selection bias. Reference management, duplicate detection, and streamlining of title, abstract, and full-text screening were conducted using the online platform Rayyan⁽¹¹⁾, a tool specifically designed for systematic reviews. Disagreements between reviewers were resolved by consensus or through consultation with a third evaluator.

Additionally, a complementary search approach known as the snowball method was applied. This strategy involved reviewing the reference lists of included studies as well as articles citing them in order to identify potentially relevant additional research. This approach increased the sensitivity of the search process and optimized the identification of pertinent studies, particularly those related to clinical efficacy and contextual implementation of the LFD in Latin American countries, where the literature may be dispersed or less extensively indexed in major databases.

Data extraction was conducted independently by two researchers, and discrepancies were resolved through con-

sensus. Key methodological and clinical characteristics of clinical trials and systematic reviews with meta-analysis were collected, including information on study design, population, intervention, and outcomes. Authors were contacted when necessary to clarify or complete missing information.

Risk of bias was independently assessed by two reviewers using the Cochrane Risk of Bias 2.0 (RoB 2.0) tool in its Excel version (version 7). This instrument evaluates the methodological quality of randomized controlled trials across five key domains and provides an overall judgment regarding risk of bias. Discrepancies between reviewers were resolved through discussion and, when necessary, with the involvement of a third evaluator⁽¹²⁾.

RESULTS

A total of 1,750 records were identified through searches across multiple databases. Of these, 947 were removed as duplicates, and 592 were excluded after initial screening

because they did not align with the objective of the review. During title and abstract screening, an additional 174 articles were excluded. Fifteen more were excluded after full-text assessment because they did not meet the established methodological criteria (Figure 1). Ultimately, 22 studies were included in the systematic review: 15 randomized controlled trials (Tables 1 and 2) and 7 systematic reviews with meta-analysis (Table 3).

The findings of this review are organized into primary and additional outcomes. Primary outcomes include reduction of gastrointestinal symptoms, comparison with other dietary interventions, effectiveness according to IBS subtype, and the role of dietary education. The reintroduction phase, impact on quality of life, treatment adherence, changes in intestinal microbiota, and nutritional safety were also evaluated. Additional outcomes included effects on body weight and BMI, mental health, functional well-being, sleep quality, and changes in dietary composition (Figure 2).

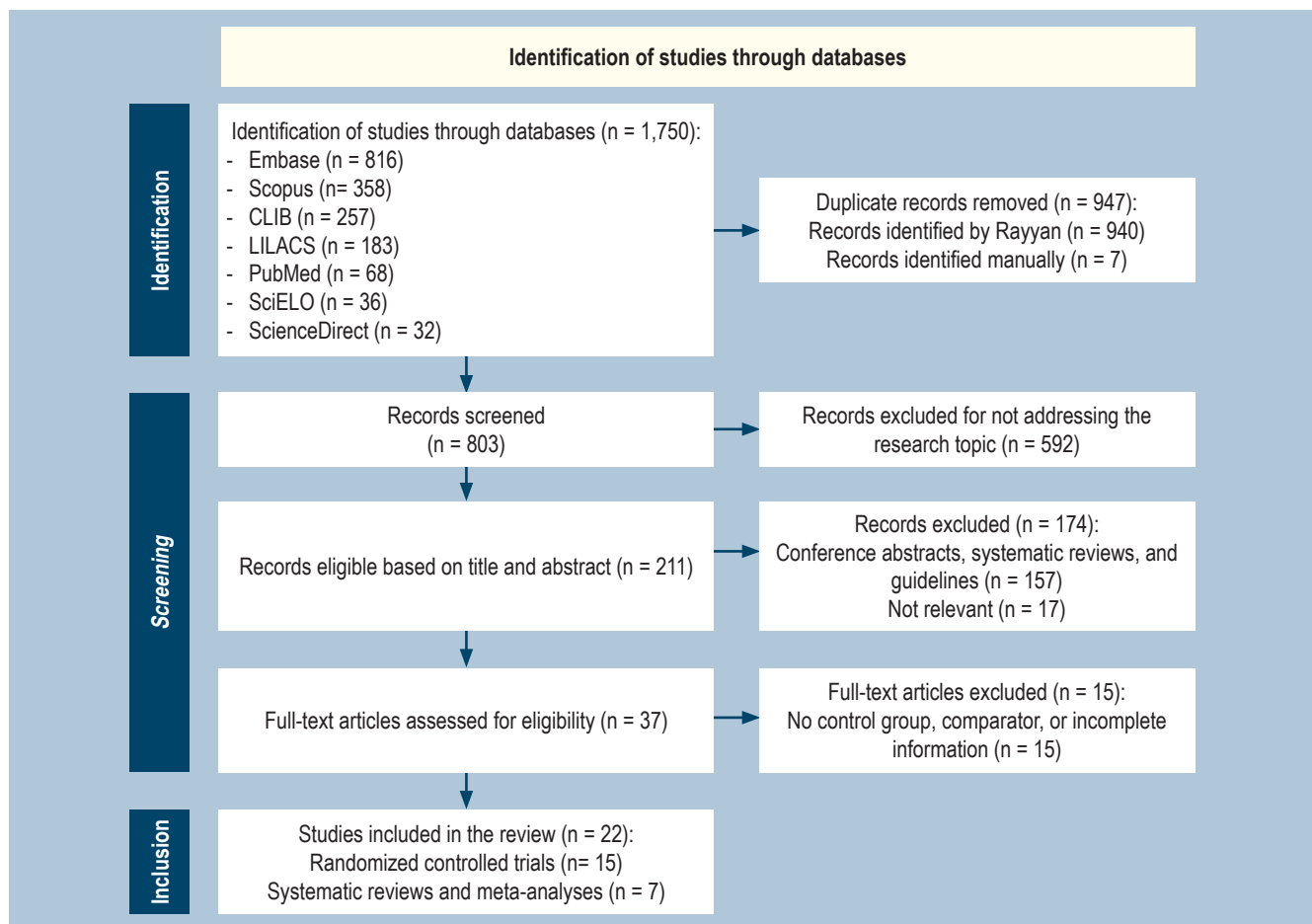


Figure 1. PRISMA flow diagram for study selection. Image property of the authors.

Table 1. Characteristics of randomized controlled trials included in the systematic review

Reference	Country	Study duration	Duration	Total, LFD	Total, comparator	Mean age	Diagnostic criteria	IBS subtype
Böhn et al. (2015)	Sweden	Multicenter, parallel, single-blind comparative RCT	4 weeks	33	34	LFD group: 44 NICE group: 41	Rome III	IBS-D IBS-C IBS-M IBS-U
Eswaran et al. (2016)	United States	Single-center, parallel superiority RCT	4 weeks	45	39	LFD group: 41.6 mNICE group: 43.8	Rome III	IBS-D
Eswaran et al. (2017)	United States	Post hoc analysis of RCT [Eswaran et al., 2016]	4 weeks	47	41	LFD group: 41.6 mNICE group: 43.8	Rome III	IBS-D
Harvie et al. (2017)	New Zealand	Parallel-design RCT	6 months	23	27	Group I: 43.3 Group II: 40.6	Rome III	IBS-D IBS-C IBS-M
Zahedi et al. (2018)	Iran	Single-blind RCT	6 weeks	50	51	Group I: 37.60 Group II: 37.43	Rome III	IBS-D
Patcharatrakul et al. (2019)	Thailand	Crossover RCT	4 weeks	30	32	Group I: 50 Group II: 52	Rome III	IBS-D IBS-C
Staudacher et al. (2020)	United Kingdom	Secondary analysis of RCT	4 weeks	63	Group II: 48 Group III: 19	Group I: 37 Group II: 34 Group III: 35	Rome III	IBS-D IBS-M IBS-U
Clevers et al. (2020)	Sweden	Post hoc analysis of RCT (Böhn et al., 2015)	4 weeks	33	33	Group I: 45 Group II: 41	Rome III	IBS-D IBS-C IBS-M
Guerreiro et al. (2020)	Portugal	Multicenter open-label RCT	4 weeks	39	18	Group I: 49.5 Group II: 52.3	Rome IV	IBS-D IBS-C IBS-M
Rej et al. (2022)	United Kingdom	RCT	4 weeks	33	Group II: 33 Group III: 33	37	Rome IV	IBS-D IBS-M
Mohseni et al. (2022)	Iran	Double-blind placebo-controlled RCT	6 weeks	26	23	38.09	Rome IV	IBS-D IBS-C IBS-M IBS-U
Chojnacki et al. (2023)	Poland	Open-label RCT	8 weeks	80	40	Group I: 46.5 Group II: 44.3	Rome IV	IBS-D
Roth et al. (2024)	Sweden	Open-label, parallel, non-inferiority RCT	4 weeks	72	72	Group I: 43 Group II: 41	Rome IV	IBS-D IBS-C IBS-M IBS-U
Tunali et al. (2024)	Turkey	Multicenter, parallel, double-blind RCT	6 weeks	51	70	18 – 65	Rome IV	IBS-D IBS-C IBS-M
Van den Houte et al. (2024)	Belgium	Double-blind crossover RCT	17 weeks (2 phases)	77	Each participant served as their own control	36.4	Rome IV	IBS-D IBS-C IBS-M IBS-U

*The traditional IBS diet consisted of general dietary advice based on the National Institute for Health and Care Excellence (NICE) and the British Dietetic Association (BDA). BSFS: Bristol Stool Form Scale; LFD: low-FODMAP diet; RCT: randomized controlled trial; GFD: gluten-free diet; GI: gastrointestinal; HADS: Hospital Anxiety and Depression Scale; IBS-QOL: Irritable Bowel Syndrome Quality of Life Questionnaire; IBS-SSS: Irritable Bowel Syndrome Severity Scoring System; mNICE: modified NICE diet; IBS-C: irritable bowel syndrome with constipation predominance; IBS-D: irritable bowel syndrome with diarrhea predominance; IBS-M: irritable bowel syndrome with mixed bowel habits; IBS-U: unsubtyped or unclassified irritable bowel syndrome; SSRD: SSRD: starch- and sucrose-reduced diet; TDA: traditional dietary advice. Table prepared by the authors.

Table 2. Characteristics of interventions in randomized controlled trials included in the systematic review

Reference	Intervention vs comparison	Assessment method	Primary outcomes	Additional outcomes	Risk of bias
Böhn et al. (2015)	LFD vs traditional IBS diet*	IBS-SSS Stool diary BSFS Food diary	No significant differences were observed between IBS subgroups in symptom severity reduction with the LFD compared with the traditional IBS diet ($p = 0.62$).	Dietary intake assessment showed reduced total carbohydrate and fiber intake in the LFD group; therefore, lower energy intake.	Low
Eswaran et al. (2016)	LFD vs mNICE diet	BSFS Stool frequency Individual symptom rating scale Food diary	Overall symptom relief did not differ significantly between diets ($p = 0.31$). Abdominal pain ($p = 0.002$), bloating ($p = 0.0008$), stool consistency ($p = 0.02$), stool frequency ($p = 0.0003$), and urgency ($p = 0.0018$) improved significantly.	Lower carbohydrate intake in the LFD group; therefore, reduced caloric intake. Fewer daily meals were also reported.	Some concerns
Eswaran et al. (2017)	LFD vs mNICE diet	IBS-QOL HADS Work productivity and activity impairment questionnaire Numeric rating scale for sleep quality and fatigue	The LFD significantly improved quality of life compared with the mNICE diet (15.9 vs 5.0 points; 95% CI: -17.4 to -4.3).	Anxiety and depression decreased significantly in the low-FODMAP group. No improvements were observed in work productivity; however, activity impairment decreased significantly. Sleep and fatigue also improved.	Some concerns
Harvie et al. (2017)	LFD with immediate dietary education vs delayed education	IBS-SSS IBS-QOL Comprehensive Nutrition Assessment Questionnaire (CNAQ)	The intervention significantly reduced IBS symptoms ($p < 0.01$). Quality of life improved ($p < 0.05$).	A significant reduction in total reported energy intake ($p < 0.01$) and fiber intake was observed.	Low
Zahedi et al. (2018)	LFD vs traditional IBS diet*	IBS-SSS BSFS IBS-QOL HADS	The LFD showed significant improvement in most IBS-SSS symptoms, including abdominal pain, bloating, and bowel habits, compared with the comparator group ($p < 0.001$).	Carbohydrate reduction was significantly greater in the LFD group ($p < 0.05$).	High
Patcharatrakul et al. (2019)	Structured individual low-FODMAP dietary counseling (SILFD) vs brief advice on a commonly recommended diet (BRD)	GI symptom questionnaire HADS	SILFD was more effective than BRD in reducing overall symptom severity, with a higher proportion of responders ($p = 0.001$) and a significant decrease in symptom severity. However, differences between diets were not significant at the end of the intention-to-treat analysis.	No additional outcomes of interest were measured.	Some concerns
Staudacher et al. (2020)	LFD vs sham diet vs habitual diet	7-day food record Healthy Diet Indicator Healthy Diet Score Diet Quality Index-Revised Dietary Diversity Score Dietary Diversity Score	The LFD effectively reduced FODMAP intake ($p < 0.001$) but decreased overall diet quality ($p = 0.006-0.018$).	Reduced starch intake ($p = 0.030$) and fat intake ($p = 0.007$). Intake of vitamin B12 and selenium improved ($p < 0.01-0.001$).	Some concerns
Clevers et al. (2020)	LFD vs traditional IBS diet*	IBS-SSS Food diary	Adherence to the LFD tended to be associated with symptom improvement ($p = 0.05$).	A 25% reduction in energy intake was observed in group I, whereas the other group showed an 11% reduction.	High

Table 2. Characteristics of interventions in randomized controlled trials included in the systematic review (*continued*)

Reference	Intervention vs comparison	Assessment method	Primary outcomes	Additional outcomes	Risk of bias
Guerreiro et al. (2020)	LFD vs standard or NICE diet	Birmingham IBS Symptom Score Questionnaire (BISS) Visual Analog Scale (VAS) IBS-QOL	Both diets significantly reduced symptoms; however, the LFD was more effective for specific symptoms. IBS-QOL improved in both groups without significant differences, although the LFD showed greater benefit in domains such as dysphoria, health concern, body image, and social functioning. Adherence was slightly higher with the LFD. No significant differences were observed at medium-term follow-up (10 weeks).	Energy and carbohydrate intake decreased in both groups. Fiber and iron intake were significantly lower in the LFD group. Participants also showed significant reductions in body weight, BMI, waist circumference, and fat mass percentage.	Low
Rej et al. (2022)	LFD vs gluten-free diet (GFD) vs traditional dietary advice (TDA)	IBS-SSS HADS Patient Health Questionnaire-12 non-GI somatic symptoms scale IBS-QOL Acceptability of Dietary Restriction Questionnaire Food-related QOL Questionnaire Comprehensive Nutrition Assessment Questionnaire (CNAQ)	TDA, GFD, and LFD represent effective approaches for IBS without constipation predominance.	The LFD improved depression compared with TDA ($p < 0.05$) and improved dysphoria more than TDA and GFD ($p < 0.05$). TDA and LFD were easier to incorporate into daily life than GFD ($p = 0.02$). The LFD showed greater reduction in fiber intake compared with GFD and TDA ($p = 0.06$).	Low
Mohseni et al. (2022)	LFD with or without gluten	IBS-QOL IBS-SSS Dietary recalls	The gluten-free group showed greater improvements in symptoms such as abdominal pain, bloating, dissatisfaction with bowel habits, interference with daily life, quality of life, stool frequency, and stool consistency ($p < 0.05$). No significant differences were observed in adherence to the LFD ($p < 0.05$).	No additional outcomes of interest were measured.	Low
Chojnacki et al. (2023)	LFD vs LFD with reduced tryptophan (TRP) intake	TRP intake: nutritional calculator IBS-SSS Hamilton Anxiety Rating Scale (HAM-A) Hamilton Depression Rating Scale (HAM-D) TRP and metabolites: liquid chromatography–tandem mass spectrometry (LC-MS/MS)	A significant reduction in somatic and psychological symptoms was observed after both dietary interventions. The effect was more favorable in the subgroup with restricted TRP intake ($p < 0.01$).	Limitation of certain traditional dietary products was poorly accepted by patients.	High

Table 2. Characteristics of interventions in randomized controlled trials included in the systematic review (*continued*)

Reference	Intervention vs comparison	Assessment method	Primary outcomes	Additional outcomes	Risk of bias
Roth et al. (2024)	LFD vs starch- and sucrose-reduced diet (SSRD)	Study questionnaire Rome IV (40–48°) IBS-SSS Visual Analog Scale for Irritable Bowel Syndrome (VAS-IBS)	Both diets significantly reduced IBS severity after two weeks. At six months, nearly half of the participants experienced only occasional abdominal pain and no longer met IBS diagnostic criteria. No significant differences were observed between diets.	Both diets reduced carbohydrate and energy intake. The SSRD showed greater reductions in starch, disaccharides, and added sugars. In the LFD group, fiber intake decreased and alcohol consumption increased. Psychological well-being and fatigue improved.	High
Tunali et al. (2024)	LFD vs personalized diet (PD)	IBS-SSS BSFS HADS IBS-QOL	The PD showed significant improvement in IBS-SSS scores, symptom relief in IBS-D, and improved IBS-QOL across all subtypes. The LFD demonstrated significant improvement in IBS-SSS scores in IBS-C and IBS-M and improved quality of life in IBS-C and IBS-D.	The LFD did not demonstrate positive effects on the intestinal microbiota. In contrast, the PD showed increased abundance of beneficial bacterial species.	Low
Van den Houte et al. (2024)	FODMAP reintroduction vs glucose (control)	IBS-SSS BSFS VAS Dietary intake record using the “MyFitnessPal” application Monash FODMAP calculator Patient Health Questionnaire (PHQ) IBS-QOL Visceral Sensitivity Index (VSI)	IBS-SSS scores decreased significantly after 2, 4, and 6 weeks compared with baseline ($p < 0.001$). Five percent of patients experienced symptom recurrence during reintroduction. Significant symptom exacerbation was observed with mannitol ($p < 0.001$) and fructan reintroduction ($p < 0.001$).	IBS subtype did not predict dietary response ($p = 0.38$). Significant reductions were observed in body weight ($p < 0.001$), caloric intake ($p < 0.001$), FODMAP intake ($p < 0.001$), fructans (56%), and mannitol (54%), which triggered symptoms in most patients.	Low

*The traditional IBS diet consisted of general dietary advice based on the National Institute for Health and Care Excellence (NICE) and the British Dietetic Association (BDA). BSFS: Bristol Stool Form Scale; LFD: low-FODMAP diet; RCT: randomized controlled trial; GFD: gluten-free diet; GI: gastrointestinal; HADS: Hospital Anxiety and Depression Scale; IBS-QOL: Irritable Bowel Syndrome Quality of Life Questionnaire; IBS-SSS: Irritable Bowel Syndrome Severity Scoring System; mNICE: modified NICE diet; IBS-C: irritable bowel syndrome with constipation predominance; IBS-D: irritable bowel syndrome with diarrhea predominance; IBS-M: irritable bowel syndrome with mixed bowel habits; IBS-U: untyped or unclassified irritable bowel syndrome; SSRD: starch- and sucrose-reduced diet; TDA: traditional dietary advice. Table prepared by the authors.

The available evidence supports the role of the LFD in reducing gastrointestinal symptoms, modulating the intestinal microbiota, improving mental health, enhancing sleep quality, supporting body weight control, and improving quality of life. These findings reflect the multidimensional benefits of the diet across physical, psychological, and metabolic domains in the management of IBS.

Primary outcomes

Reduction of gastrointestinal symptoms

Multiple studies have demonstrated that the LFD is effective in reducing symptoms of irritable bowel syndrome, although results may vary according to the type of intervention, comparator group, and IBS subtype evaluated^(6,13-17).

Table 3. Characteristics of systematic reviews and meta-analyses included in the systematic review

Reference	Number of studies/type	Total sample	Primary variable	Main conclusion	Key limitations
Varjú et al. (2017)	5 RCTs 2 NRCTs 3 uncontrolled prospective studies	1573	Overall symptoms Quality of life	The LFD significantly improves overall symptoms and quality of life in patients with IBS.	Heterogeneity in IBS symptom severity scales. Lack of data on IBS subtypes. Variability in control diets.
Hahn et al. (2021)	20 RCTs 2 NRCTs	1406	Overall symptoms Quality of life Bowel habits	The LFD reduced symptom severity and improved quality of life and bowel habits.	Lack of standardization across studies regarding diet implementation, sex distribution, and IBS subtype. Small subgroup samples.
Van Lanen et al. (2021)	12 RCTs	772	Gastrointestinal symptoms Quality of life Nutritional adequacy Intestinal microbiome	The LFD reduces gastrointestinal symptoms and improves quality of life.	Study heterogeneity. Lack of adherence assessment in several studies.
Wang et al. (2021)	10 RCTs	511	Overall symptom improvement Stool output Quality of life HADS BMI	The LFD significantly reduces overall IBS symptoms and improves stool output, particularly in IBS-D.	Small sample size. Lack of subgroup analysis by IBS subtype. Absence of unified measurement scale.
So et al. (2022)	9 RCTs	2748	Microbiome composition and function	Overall microbiome composition may not be substantially altered by the LFD.	Small sample size. High design heterogeneity. Difficulty synthesizing extensive data. Limited microbiome and virome evaluation.
Jent et al. (2024)	11 RCTs 19 observational studies	2748	Abdominal pain Stool consistency Stool frequency Overall symptoms and symptom relief Quality of life Adherence	The LFD improves IBS symptoms.	Wide variety of measurement instruments. Difficulty interpreting stool consistency outcomes. Complexity in differentiating study populations. Risk of bias and diversity of study designs. Use of per-protocol analyses in some RCTs.
Haghbin et al. (2024)	23 RCTs	1689	IBS QOL IBS-SSS	The LFD demonstrated superiority in managing IBS symptoms and improving quality of life. The Mediterranean diet also emerges as a promising alternative.	Study heterogeneity. Recall bias. Lack of participant blinding. Limited data on adherence to restrictive diets. Absence of direct comparisons with other dietary approaches. Inconsistent definition of the Mediterranean diet.

Non-randomized clinical trial (NRCT); PP: per-protocol population. Table prepared by the authors.

Most studies included in this review report a significant reduction in gastrointestinal symptom severity, primarily assessed using the IBS-SSS scale. A Swedish study comparing the LFD with a conventional diet based on NICE and BDA guidelines over four weeks observed improvements in stool frequency, although no substantial changes were detected in stool consistency⁽¹³⁾.

Comparisons with other diets and interventions

Randomized controlled trials reported significant reductions in abdominal pain and bloating, as well as improvements in stool frequency and consistency. These effects were more pronounced in groups following the LFD compared with conventional dietary interventions^(14,18), findings supported by two meta-analyses demonstrating the effectiveness of the

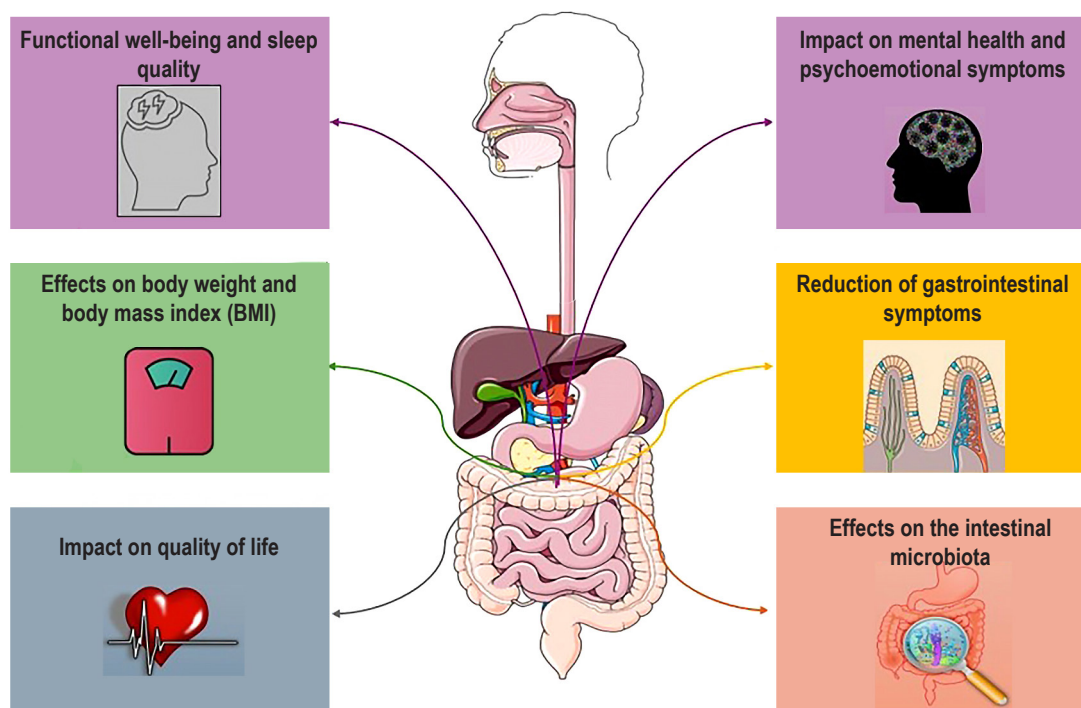


Figure 2. Clinical effects associated with the low-FODMAP diet in patients with IBS. Image property of the authors.

LFD^(19,20). However, another meta-analysis indicates that although symptom reduction is maintained over the long term, available data remain limited⁽²¹⁾.

Although no statistically significant differences were observed between diets in terms of global symptom relief, the LFD group showed sustained improvements in individual symptoms from the first week of treatment^(22,23). Similarly, a significant reduction in symptom frequency, particularly pain and diarrhea, has been documented, with a success rate of 56.4% compared with 22.2% in the control group⁽¹⁵⁾.

With respect to effectiveness across IBS subtypes, findings have been heterogeneous. Some studies reported no relevant differences between subgroups⁽¹³⁾, whereas others identified greater effectiveness in patients with IBS-C⁽¹⁸⁾. Evidence also suggests a potential advantage of personalized diets over the LFD in IBS-D⁽¹⁶⁾. Therefore, although differences between diets were not always statistically significant, clinically meaningful benefits were observed, particularly in bloating and bowel dissatisfaction^(17,24).

Dietary education represents another important factor, as one study demonstrated that participants who received education at the initiation of the LFD experienced early and sustained improvements in abdominal pain and stool frequency. In contrast, the group receiving delayed education showed improvement only after receiving dietary counseling⁽²⁵⁾. Similar findings were reported in a meta-

analysis demonstrating improvement in abdominal pain, bloating, and stool frequency⁽²⁶⁾.

Recent studies have also explored combined dietary approaches. For instance, a diet combining reduced tryptophan intake with the LFD showed greater effectiveness in IBS-D than the LFD alone⁽²⁷⁾. Additionally, the LFD has been compared with a sucrose-reduced diet. Both groups showed high clinical response rates. However, the sucrose-reduced diet demonstrated greater improvement in most symptoms, except constipation⁽²⁸⁾.

Reintroduction phase and individual sensitivity

During the reintroduction phase, one study⁽⁵⁾ demonstrated that after six weeks of restriction, the reintroduction of mannitol and fructans resulted in a significant increase in IBS-SSS scores, accompanied by symptoms such as abdominal pain, bloating, and flatulence. Reactions were also observed following consumption of galactooligosaccharides (GOS), sorbitol, and lactose, although with lower intensity⁽⁶⁾.

Participants discontinued intake of mannitol earlier (day 2), followed by fructans (day 4) and GOS (day 5), suggesting greater sensitivity to these compounds. Consequently, the authors recommend prioritizing the reintroduction of FODMAPs with lower symptom-inducing potential before introducing fructans and mannitol⁽⁶⁾.

Impact on quality of life

The LFD has demonstrated greater improvement in quality of life compared with other dietary interventions, particularly in domains related to anxiety, dysphoria, and psychosocial functioning, based on assessments using the IBS-QOL questionnaire⁽²⁹⁾. Another clinical trial reported sustained increases in IBS-QOL scores following LFD intervention, with an average improvement of approximately 14 points between weeks two and six of follow-up⁽⁶⁾. Although domains such as food avoidance and dietary concern showed smaller changes, an overall positive effect was observed in perceived general and social well-being⁽²⁵⁾.

Similarly, additional studies reported improvements associated with the LFD compared with baseline and with traditional dietary approaches⁽¹⁷⁾, with beneficial effects across multiple IBS-QOL domains⁽¹⁵⁾. However, mixed findings have also been documented. In some studies, both dietary interventions reduced the impact of symptoms on quality of life⁽¹³⁾. Other studies reported decreased quality of life at six weeks in both comparison groups⁽¹⁴⁾ or improvements in both gluten and placebo groups without statistically significant differences⁽²⁴⁾.

Systematic reviews and meta-analyses largely support the positive impact of the LFD on quality of life. These analyses identified mild to moderate improvement compared with control groups⁽²³⁾, with higher IBS-QOL scores observed in favor of the LFD⁽³⁰⁾. Although not all results reached statistical significance, the overall trend supported the effectiveness of this intervention⁽²¹⁾. Finally, one systematic review concluded that both the LFD and the Mediterranean diet significantly improved quality of life. However, the Mediterranean diet ranked as the most effective according to comparative classification analysis⁽²⁶⁾.

Dietary adherence and acceptability

Adherence represents a key determinant of LFD effectiveness. Dietary compliance was assessed using food frequency records. Participants with higher adherence to the LFD demonstrated greater reductions in FODMAP intake and greater clinical improvement in gastrointestinal symptoms⁽¹⁸⁾. Adherence rates of up to 83% during the restriction phase have been reported, along with high levels of satisfaction, particularly regarding integration of the diet into daily life. However, cost was identified as the domain with the lowest satisfaction rate^(15,31).

Effects on the intestinal microbiota

The LFD intervention has shown a tendency to reduce the abundance of bifidobacteria, particularly *Bifidobacterium adolescentis*, as well as the broader phylum Actinobacteria^(16,30,32). In contrast, no significant differences were observed in other bacterial groups such as *Bacteroides*

or *Firmicutes*⁽³²⁾. Similarly, microbial composition changes have been documented after four weeks of LFD intervention, including a reduction in bifidobacteria abundance⁽¹⁷⁾.

However, some studies did not identify significant changes in intestinal microbiota composition, particularly when samples were not affected by thawing. These findings suggest that, at least in the short term, the LFD may not substantially alter microbiota composition detectable through 16S ribosomal RNA analysis⁽²⁵⁾. Conversely, when compared with a personalized diet, the latter produced greater changes in alpha diversity, increased abundance of *Faecalibacterium prausnitzii*, and a significant reduction in Ruminococcaceae, effects not observed with the LFD⁽¹⁶⁾.

Nutritional safety and adverse effects

No serious adverse effects or unexpected symptoms associated with the LFD have been reported. However, one study indicated that this intervention resulted in lower diet quality scores compared with a habitual control diet, although no differences were observed when compared with a sham control diet, according to the Healthy Diet Indicator⁽³³⁾. Another clinical trial identified mild alterations in micronutrient intake following LFD intervention, including vitamin A, riboflavin, calcium, thiamine, and iron⁽³⁰⁾.

Additional outcomes

Effects on body weight and body mass index

The impact of the LFD on body mass index (BMI) and body weight has been evaluated with heterogeneous findings. Some systematic reviews reported that only a limited number of studies assessed these outcomes, with no statistically significant differences observed^(20,27). However, other clinical trials demonstrated significant reductions in body weight and BMI in both intervention groups (LFD and SSRD) following a four-week intervention, with partial weight regain over time. Waist circumference remained reduced⁽²⁸⁾. In addition, significant reductions in body weight, caloric intake, and FODMAP consumption have been documented⁽⁶⁾.

Impact on mental health and psychoemotional symptoms

Beyond gastrointestinal benefits, the LFD has demonstrated positive effects on mental health, sleep quality, and overall well-being in patients with irritable bowel syndrome. Two studies reported significant improvement in anxiety levels, assessed using the HADS scale, after four weeks of LFD intervention compared with the comparator group, in which no meaningful changes were observed.

Although depression scores improved in both groups, only the LFD group showed statistically significant improvement relative to baseline values⁽¹⁶⁾. These findings were

supported by a study conducted in the United Kingdom, which also reported significant improvement in depressive symptoms and dysphoria among participants following the LFD⁽¹⁷⁾. Furthermore, reduced tryptophan intake combined with the LFD resulted in significant improvement in both somatic and psychological symptoms, suggesting a potential synergistic effect between specific dietary components and IBS management⁽²⁷⁾.

Functional well-being and sleep quality

Functional well-being outcomes, including work productivity and impairment in daily activities, have also been evaluated. No statistically significant differences were observed between groups in indicators such as absenteeism or presenteeism. However, both groups improved compared with baseline values, with greater improvement observed in the LFD group. Mean scores for sleep and fatigue also improved significantly following LFD intervention, particularly in sleep quality and sleep initiation, although differences between groups were not statistically significant⁽²⁹⁾.

Changes in dietary composition and diet quality

Finally, regarding dietary changes associated with LFD implementation, marked reductions in FODMAP intake, total caloric intake, carbohydrate intake, and fiber intake have been reported^(13,14,18,22,25,28). In some cases, a lower frequency of meals and reduced consumption of snacks, dairy products, and beverages were observed, although coffee and alcohol consumption remained partially unchanged⁽³¹⁾. Significant reductions in energy and carbohydrate intake were observed in both intervention groups. However, lower intake of fiber and iron was reported in the LFD group^(15,17,24). In one intervention, participants reduced total FODMAP intake to less than 2 g/day, with variable changes in macronutrient intake depending on the assigned group⁽²⁴⁾. Following the reintroduction phase, some nutritional reductions, such as fiber intake, showed partial recovery⁽²⁵⁾.

DISCUSSION

This systematic review synthesizes recent evidence on the efficacy and clinical applicability of the low-FODMAP diet (LFD) in adults with irritable bowel syndrome. The findings consistently indicate a significant reduction in gastrointestinal symptoms, particularly among patients with diarrhea-predominant or mixed subtypes, as well as meaningful improvements in quality of life and psychological dimensions. Overall, the evidence supports the LFD as an effective dietary intervention for symptomatic management of irritable bowel syndrome and improvement of

overall patient well-being⁽³⁴⁾, with high acceptability and a low risk of adverse effects when implemented with professional guidance⁽³⁵⁾. Furthermore, clinical practice guidelines for IBS issued by the National Institute for Health and Care Excellence (NICE) and the World Gastroenterology Organisation (WGO) recognize the LFD as an effective therapeutic option^(36,37).

Regarding gastrointestinal symptoms, findings were consistent across studies, demonstrating significant symptom reduction following adherence to the LFD compared with conventional diets or placebo interventions^(34,35,38-44). This pattern has been observed in both European and Latin American contexts, where improvements in abdominal pain, bloating, stool frequency, and quality of life have also been reported^(45,46). These outcomes were primarily evaluated using validated instruments such as the IBS-SSS, strengthening the reliability of the evidence, although the inherent limitations of self-reported scales are acknowledged.

The LFD was consistently associated with improvements in quality of life among patients with IBS, with benefits observed in psychosocial domains compared with sham dietary interventions⁽³⁵⁾ and sustained improvements over both short- and long-term follow-up in pain, vitality, and social functioning⁽⁴⁰⁾. Quality of life increased significantly across all IBS-QOL domains, with an overall improvement of approximately 14 points⁽⁴⁶⁾. No relevant differences were identified according to the level of dietary adherence or degree of professional support⁽⁴⁷⁾. Improvements were more pronounced in patients with IBS-D and IBS-M, particularly in dysphoria, body image, and activity interference, whereas in IBS-C improvement was limited primarily to dysphoria⁽⁴⁸⁾. Additionally, seven of the nine quality-of-life domains evaluated improved following dietary intervention⁽⁴⁴⁾.

Dietary adherence plays a crucial role in intervention success, long-term willingness to maintain the diet, and improvement across multiple health dimensions. Professional support has been consistently identified as a determining factor in adherence across several studies⁽⁴⁹⁻⁵¹⁾. Evidence also indicates that the LFD may demonstrate enhanced effectiveness when combined with complementary therapies such as cognitive behavioral therapy, yoga, meditation, or hypnotherapy^(38,52). Similarly, the incorporation of functional food components, such as turmeric extracts, has demonstrated reductions in abdominal bloating and intestinal dysbiosis⁽⁵³⁾. The most frequently reported reasons for discontinuation include limited time availability to follow the diet, occupational constraints related to cost, and motivational factors⁽⁴⁷⁾.

Recent findings have questioned the necessity of strict restriction of all FODMAP components in IBS management. Eswaran et al.⁽⁵⁴⁾ demonstrated that after completion

of the LFD phase, only fructans induced statistically significant worsening of abdominal pain during reintroduction, whereas galactooligosaccharides increased bloating without a clear effect on pain. Similarly, Singh et al.⁽⁵⁵⁾ compared a traditional low-FODMAP diet with a simplified version restricting only fructans and galactooligosaccharides. Both groups demonstrated similar clinical response rates; however, the traditional LFD showed higher discontinuation rates due to adherence difficulties and tolerability concerns. These findings underscore the importance of individualized dietary strategies and highlight that not all FODMAP components exert equivalent effects across patients. They also reinforce the need to incorporate key variables such as adherence and dietary sustainability into clinical evaluation, factors frequently underreported in systematic reviews but highly relevant in clinical practice.

Adverse effects were minimal and generally transient, with some studies reporting mild symptom worsening in a small proportion of participants⁽³⁵⁾. The LFD appears safe in the short term; however, further evidence is required to establish long-term safety.

A relevant aspect identified was the impact on the intestinal microbiota. Most studies report a significant reduction in *Bifidobacterium*, which may compromise microbial diversity and contribute to dysbiosis due to restriction of prebiotic substrates, with potential long-term implications^(35,56-58). A general reduction in total microbiota abundance and butyrate production has also been described, although multistrain probiotic supplementation may mitigate these effects⁽⁵⁶⁾. Regarding bacterial composition, the LFD has been associated with reduced *Lactobacillus*. In patients with pain-predominant IBS (IBS-P), increased abundance of *Bacteroides* and reduced pathogenic bacteria have been reported, effects not observed in unsubtyped IBS (IBS-S) or in healthy controls^(59,60).

Regarding nutritional status, studies indicate that both the standard LFD and adapted versions do not produce significant changes in anthropometric parameters or hydration status in the short or long term^(40,48). Nevertheless, weight loss or gain has been observed in some patients, suggesting heterogeneous individual responses and highlighting the need for nutritional monitoring⁽³⁹⁾. A significant reduction in body fat percentage has also been reported following intervention⁽⁶¹⁾.

Beneficial psychological effects associated with the LFD have also been demonstrated. The findings of this review are supported by clinical trials that evaluated psychological outcomes, showing significant improvements in symptoms of anxiety and depression, sleep quality, and fatigue⁽⁴⁰⁾.

The LFD also modifies habitual dietary patterns through the exclusion of commonly consumed foods such as wheat,

dairy products, and certain fruits and vegetables. Although intake of energy, protein, and fat generally remains stable, carbohydrate and fiber intake tends to decrease, which may represent a disadvantage for patients with IBS-C⁽⁶²⁾. Despite concerns regarding potential nutritional deficiencies, these risks may be mitigated during the reintroduction phase, and overall nutritional adequacy does not appear compromised, particularly when individualized dietary approaches are applied^(56,57). Some studies report short-term reductions in caloric intake and micronutrients such as calcium and thiamine^(39,63), whereas others demonstrate that adapted versions of the diet maintain adequate intake and improve overall dietary quality^(49,64).

This review incorporated high-level evidence, including 15 randomized controlled trials and 7 systematic reviews with meta-analysis, all with control groups and a minimum duration of four weeks. Studies focused exclusively on adults diagnosed with irritable bowel syndrome and included a considerable total sample size of 1,315 participants across randomized controlled trials. Findings were consistent across studies and were evaluated using validated instruments for symptom severity, quality of life, and adherence, which contributed to a low risk of bias in most trials. The publication timeframe (2015–2024) further supports the relevance and contemporaneity of the evidence.

Nevertheless, several important limitations were identified. Variability in symptom measurement across studies was observed, along with limited information on adherence and lack of long-term outcome data due to the scarcity of prospective studies. In addition, limited cultural and geographic diversity, with predominance of European study populations, restricts generalizability of findings to other contexts, particularly Latin America. Although some studies describe dietary habits among patients with IBS in Latin America^(45,65,66), further research is required to evaluate the effectiveness of the LFD in this geographic context and to identify dietary challenges specific to these populations. Furthermore, this systematic review was limited by heterogeneity in outcome definitions across included studies, which precluded quantitative synthesis through meta-analysis.

The LFD represents an effective strategy for IBS management, particularly when individualized according to patient subtype. Nutritional education and professional guidance are essential to ensure adherence. Although the diet improves quality of life and emotional symptoms, monitoring of nutritional intake remains necessary to prevent potential deficiencies. Effects on the intestinal microbiota appear mild and transient. Additionally, combination with complementary therapies such as cognitive behavioral therapy or yoga may enhance clinical benefits.

CONCLUSIONS

The low-FODMAP diet has demonstrated effectiveness in reducing gastrointestinal symptoms and improving quality of life in patients with irritable bowel syndrome. Its implementation is also associated with benefits in

psychological well-being, including reductions in anxiety symptoms and dysphoria. These findings highlight the importance of promoting adequate dietary adherence, as well as the need for individualized management supported by professional guidance to maximize the clinical effectiveness of this dietary strategy.

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