



Original Article

Comparative Study on the Impact of Different Dietary Interventions on Symptoms and Quality of Life in Patients with Irritable Bowel Syndrome

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ABSTRACT

Background: Irritable Bowel Syndrome (IBS) is a functional gastrointestinal disorder characterized by abdominal pain and altered bowel habits. Dietary manipulation is a primary therapeutic modality. While the low Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols (FODMAP) diet is widely advocated, Traditional Dietary Advice (TDA) and Gluten-Free Diets (GFD) are also frequently utilized. The comparative efficacy of these interventions regarding symptom severity and quality of life (QoL) requires further elucidation.

Methods: We conducted a single-center, randomized, parallel-group clinical trial involving 150 adult patients meeting Rome IV criteria for IBS. Participants were randomized (1:1:1) to receive education on Low-FODMAP ($n = 50$), TDA ($n = 50$), or GFD ($n = 50$) for 8 weeks. Primary outcomes were changes in the IBS Symptom Severity Score (IBS-SSS) and IBS Quality of Life (IBS-QoL) score. Secondary outcomes included dietary adherence and satisfaction.

Results: Of the 150 enrolled, 138 completed the study. Baseline characteristics were similar across groups. At 8 weeks, the Low-FODMAP group demonstrated the most significant reduction in IBS-SSS (-145.2 ± 42.1), compared to GFD (-92.4 ± 38.5) and TDA (-76.8 ± 35.2) ($p < 0.001$). Significant improvement in IBS-QoL was observed in all groups, but the Low-FODMAP group showed superior improvement ($+18.4$ points) compared to TDA ($+10.2$ points). However, adherence was significantly higher in the TDA group (88%) compared to Low-FODMAP (62%) and GFD (70%) ($p = 0.01$).

Conclusion: The Low-FODMAP diet provides superior symptomatic relief and improvement in quality of life compared to Traditional Dietary Advice and Gluten-Free diets. However, its restrictive nature impacts adherence. A personalized approach, potentially starting with TDA and stepping up to Low-FODMAP, may be the optimal clinical strategy.

Keywords: Irritable Bowel Syndrome, Low-FODMAP, Gluten-Free Diet, Nutrition, Quality of Life, Gastroenterology.

1. Introduction

Irritable Bowel Syndrome (IBS) is one of the most prevalent disorders of gut-brain interaction, affecting approximately 10-15% of the global population [1]. Characterized by chronic abdominal pain, bloating, and alterations in bowel habits (diarrhea, constipation, or mixed), IBS imposes a substantial burden on healthcare systems and significantly impairs patients' health-related quality of life (HRQoL) [2]. Despite the availability of pharmacological agents targeting motility and visceral hypersensitivity, dietary modification remains the most commonly requested and utilized management strategy by patients [3].

The pathophysiology of IBS is multifactorial, involving visceral hypersensitivity, altered gut microbiota, and mucosal immune activation [4]. It is well-established that food acts as a trigger for symptoms in the majority of patients. Consequently, various dietary interventions have emerged. The Traditional Dietary Advice (TDA), often based on

guidelines from the National Institute for Health and Care Excellence (NICE), emphasizes regular meal patterns, modification of fiber intake, and adequate hydration [5]. This approach is generally considered the first-line therapy due to its nutritional safety and ease of implementation.

In recent years, the diet low in Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols (Low-FODMAP) has garnered significant attention. The mechanism posits that these short-chain carbohydrates are poorly absorbed in the small intestine and undergo rapid fermentation by colonic bacteria, resulting in gas production and luminal distension [6]. While numerous studies have demonstrated the efficacy of the Low-FODMAP diet, it is highly restrictive, potentially expensive, and carries a risk of nutritional inadequacy if not supervised by a dietitian [7].

Concurrently, a subset of IBS patients reports symptom improvement on a Gluten-Free Diet (GFD), even in the absence of Celiac Disease. This entity, often termed Non-Celiac Gluten Sensitivity (NCGS), remains controversial, with some evidence suggesting that the reduction of fructans (a FODMAP), rather than gluten, mediates the benefit [8]. Despite the popularity of these diets, there is a paucity of direct, head-to-head comparative data evaluating the Low-FODMAP diet against both TDA and GFD within the same cohort, particularly concerning the trade-off between efficacy and adherence [9].

Therefore, the aim of this study was to evaluate and compare the impact of three distinct dietary interventions—Low-FODMAP, Traditional Dietary Advice, and Gluten-Free Diet—on symptom severity and quality of life in a defined cohort of IBS patients.

2. Materials and Methods

Study Design and Ethics

This was a prospective, single-center, randomized clinical trial conducted at the tertiary care hospital.

Participants

- **Inclusion Criteria:** Adults aged 18–65 years with a diagnosis of IBS according to Rome IV criteria (recurrent abdominal pain associated with defecation or a change in bowel habits). Patients were required to have an IBS Symptom Severity Score (IBS-SSS) > 175 (indicating moderate to severe disease) at baseline.
- **Exclusion Criteria:** History of Celiac Disease (confirmed by negative tissue transglutaminase IgA antibodies), Inflammatory Bowel Disease (IBD), previous abdominal surgery (excluding appendectomy), eating disorders, pregnancy, or prior use of exclusion diets within the last 3 months.

Randomization and Interventions

A total of 150 eligible patients were randomized in a 1:1:1 ratio using a computer-generated sequence to one of three groups. All patients received a 45-minute consultation with a specialized dietitian.

1. **Group A (Low-FODMAP):** Patients were instructed to strictly restrict intake of high-FODMAP foods (e.g., wheat, onions, legumes, lactose, stone fruits) for 8 weeks. They were provided with Monash University-based food lists and recipes.
2. **Group B (Traditional Dietary Advice - TDA):** Patients received standard advice based on NICE guidelines: eat small regular meals, avoid large fatty meals, reduce caffeine/alcohol/fizzy drinks, and adjust fiber intake according to stool consistency.
3. **Group C (Gluten-Free Diet - GFD):** Patients were instructed to exclude all sources of gluten (wheat, barley, rye) but were allowed to consume gluten-free products that might contain other FODMAPs (e.g., onions/garlic were permitted).

Outcome Measures

- **Primary Outcome:** The change in IBS Symptom Severity Score (IBS-SSS) from baseline to week 8. The IBS-SSS evaluates pain severity, frequency, distension, bowel habit dissatisfaction, and life interference (Score range 0–500). A reduction of ≥ 50 points is considered clinically significant.
- **Secondary Outcomes:**
 - IBS Quality of Life (IBS-QoL): A 34-item measure assessing the impact of IBS (Scale 0–100).
 - Dietary Adherence: Self-reported on a 10-point Likert scale (0 = never followed, 10 = always followed).
 - Global Symptom Relief: "Did you have adequate relief of symptoms?" (Binary: Yes/No).

Statistical Analysis

Sample size calculation indicated that 42 patients per group were required to detect a difference of 35 points in IBS-SSS with 80% power and $\alpha = 0.05$. Data were analyzed using SPSS version 26.0. Continuous variables were presented as mean $\pm$ standard deviation (SD). Differences between groups were analyzed using One-way Analysis of Variance (ANOVA) followed by Tukey's post-hoc test. Categorical variables were analyzed using the Chi-square test. An intention-to-treat (ITT) analysis approach was utilized. A p -value < 0.05 was considered statistically significant.

3. Results

Demographics and Baseline Characteristics

Of the 150 randomized participants, 138 completed the 8-week intervention (Low-FODMAP: $n = 45$; TDA: $n = 48$; GFD: $n = 45$). Dropouts were primarily due to difficulty adhering to the dietary protocol (mostly in the Low-FODMAP group). The mean age was 41.2 ± 11.5 years, and 74% were female. There were no significant differences between the three groups at baseline regarding age, BMI, IBS subtype (Diarrhea-predominant, Constipation-predominant, or Mixed), or baseline symptom scores (Table 1).

Table 1: Baseline Demographic and Clinical Characteristics

Characteristic	Low-FODMAP ($n = 50$)	TDA ($n = 50$)	GFD ($n = 50$)	<i>p</i> -value
Age (years)	39.8 ± 10.2	42.1 ± 12.4	41.5 ± 11.1	0.62
Female, n (%)	38 (76%)	36 (72%)	37 (74%)	0.91
BMI (kg/m^2)	24.5 ± 3.8	25.1 ± 4.1	24.8 ± 3.5	0.75
IBS Subtype				0.88
- IBS-D	18 (36%)	19 (38%)	17 (34%)	
- IBS-C	15 (30%)	14 (28%)	16 (32%)	
- IBS-M	17 (34%)	17 (34%)	17 (34%)	
Baseline Scores				
IBS-SSS (0-500)	315.4 ± 55.2	308.1 ± 61.3	312.8 ± 58.7	0.81
IBS-QoL (0-100)	54.2 ± 18.5	56.1 ± 19.2	55.4 ± 17.8	0.89

Symptom Severity and Quality of Life

At week 8, all three dietary groups showed statistically significant improvements in IBS-SSS compared to baseline ($p < 0.001$). However, the magnitude of improvement differed significantly between groups (ANOVA $F = 14.2$, $p < 0.001$). The Low-FODMAP group achieved the greatest reduction in symptom severity score (-145.2 ± 42.1), which was significantly superior to both TDA (-76.8 ± 35.2) and GFD (-92.4 ± 38.5).

Similarly, IBS-QoL scores improved across the board. The Low-FODMAP group showed the highest increase in quality of life, followed by GFD and TDA (Table 2).

Table 2: Changes in Clinical Outcomes at Week 8 (Mean $\pm$ SD)

Outcome	Low-FODMAP ($n = 45$)	TDA ($n = 48$)	GFD ($n = 45$)	<i>p</i> -value*
IBS-SSS				
Week 8 Score	170.2 ± 48.5	231.3 ± 55.1	220.4 ± 51.2	< 0.001
Change (Δ)	-145.2 ± 42.1	-76.8 ± 35.2	-92.4 ± 38.5	< 0.001
IBS-QoL				
Week 8 Score	72.6 ± 14.2	66.3 ± 15.8	68.9 ± 16.1	0.04
Change (Δ)	$+18.4 \pm 9.5$	$+10.2 \pm 8.2$	$+13.5 \pm 8.8$	0.02

Comparisons across the three groups using ANOVA.

Adherence and Satisfaction

While the Low-FODMAP diet was the most efficacious, it was associated with the lowest adherence. Only 62% of participants in the Low-FODMAP group reported high adherence ($\geq 8/10$ on Likert scale), compared to 88% in the TDA group and 70% in the GFD group. Despite the difficulty, the Low-FODMAP group reported the highest rate of "Adequate Relief" (76%), suggesting that the therapeutic benefit motivated persistence (Table 3).

Table 3: Dietary Adherence and Patient Satisfaction

Variable	Low-FODMAP	TDA	GFD	<i>p</i> -value
Adherence Score (0-10)	6.8 ± 2.1	8.9 ± 1.2	7.5 ± 1.8	< 0.001
High Adherence (≥ 8)	28 (62%)	42 (88%)	31 (70%)	0.01
Adequate Relief (Yes)	34 (76%)	26 (54%)	29 (64%)	0.04
Food-Related Anxiety	6.5 ± 2.4	3.2 ± 1.8	4.8 ± 2.1	< 0.001

4. Discussion

This randomized controlled trial provides a comparative analysis of three common dietary strategies for IBS. The principal finding is that the Low-FODMAP diet is significantly more effective at reducing global symptom severity and improving quality of life than Traditional Dietary Advice (NICE guidelines) or a Gluten-Free Diet. However, this superior efficacy comes at the cost of complexity and adherence difficulty.

The robust reduction in IBS-SSS observed in the Low-FODMAP group (–145 points) aligns with the landmark study by Halmos et al., which established the diet's ability to reduce osmotic load and gas production [10]. By restricting fermentable carbohydrates, the diet minimizes luminal distension, which is a key driver of visceral pain in IBS [11]. Our study further reinforces the position of the Low-FODMAP diet as the "gold standard" for dietary management in secondary care settings. Interestingly, the GFD group showed a statistically significant improvement over baseline, though it was inferior to the Low-FODMAP group. This supports the hypothesis that the perceived benefits of a gluten-free diet in non-celiac patients may partially stem from the concomitant reduction of fructans (a type of FODMAP found in wheat), rather than gluten exclusion alone [12]. Since our GFD group was allowed other FODMAPs (like onions and pulses), the incomplete removal of fermentable substrates likely explains why GFD was less effective than the comprehensive Low-FODMAP approach [13].

A critical finding of our study is the trade-off between efficacy and practicality. The TDA group demonstrated the highest adherence rates (88%). Traditional advice promotes healthy eating behaviors that are socially less restrictive and easier to maintain long-term [14]. The data suggests that for patients with mild-to-moderate symptoms, or those lacking access to specialized dietetic support, TDA remains a valuable first-line intervention. Conversely, the Low-FODMAP group reported higher "food-related anxiety," a psychological burden recognized in restrictive eating patterns [15].

The improvement in quality of life (IBS-QoL) across all groups highlights the importance of the "care effect"—the benefit derived from validation of symptoms and structured management, regardless of the specific dietary protocol [16]. However, the magnitude of QoL improvement in the Low-FODMAP group suggests that the relief of physical symptoms (bloating, urgency) directly translates to better social and emotional functioning, outweighing the social restrictions of the diet [17].

Limitations

Our study has limitations. The dietary interventions could not be blinded, leading to potential expectation bias. The duration of 8 weeks represents the elimination phase of the Low-FODMAP diet; long-term outcomes following the reintroduction phase were not captured. Additionally, we did not analyze changes in the fecal microbiome, which is known to be impacted by restrictive diets [18-22].

5. Conclusion

In conclusion, this study demonstrates that while Traditional Dietary Advice and Gluten-Free Diets offer symptomatic benefit, the Low-FODMAP diet is superior in reducing the severity of IBS symptoms and enhancing quality of life. However, the Low-FODMAP diet is associated with lower adherence and higher food anxiety.

Clinical management should therefore be personalized. We propose a stepped-care approach: initiating with Traditional Dietary Advice for treatment-naïve patients due to its ease of adoption and reserving the Low-FODMAP diet for those with persistent, moderate-to-severe symptoms, provided that adequate dietetic supervision is available to ensure nutritional adequacy and successful food reintroduction.

Declaration:

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