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Original Article

Efficacy of Low FODMAP Diet Intervention on Irritable Bowel Syndrome

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Tawfiq Aziz[1*], Mahfuzur Rahman[2], Fahiya Rahman[3], Nowshin Karim Chowdhury[4]

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*Corresponding Author

ABSTRACT

Background: *Irritable Bowel Syndrome (IBS) occurs in 8-12% of the Bangladeshi population with a large impact on quality of life. Management, despite its prevalence, is still largely symptom-based with poor results. The Low FODMAP diet has been proven to be beneficial in Western populations, but implementation in Bangladesh is faced with particular cultural and food-related challenges.* ***Methods & Materials:*** *This prospective longitudinal study enrolled 100 adult patients meeting Rome IV criteria for IBS. Patients were instructed by a trained dietitian in a systematic manner regarding a culturally-adjusted Low FODMAP diet and followed up for 12 weeks. Outcome measures included improvement in symptoms, diet compliance, and change in quality of life determined by the Gastrointestinal Quality of Life Index (GIQLI) (1). Statistical analysis included chi-square tests, binary logistic regression, and Cox proportional hazards modeling.* ***Results:*** *70% of participants reported symptom improvement after 12 weeks. Adherence to the diet was strongly associated with symptom improvement (χ^2 = 29.7, p<0.001) and was the optimal predictor of improvement (OR = 9.2, 95% CI: 3.41-24.81, p<0.001). IBS-D participants responded slightly better (OR = 2.40, 95% CI: 1.01-5.72, p=0.046). Severe symptoms decreased by 50%, and the proportion of participants with mild symptoms increased by 300%. GIQLI scores were greatly improved from 85±12 to 105±10 (p<0.001).* ***Conclusion:*** *Culturally-adapted Low FODMAP diet significantly improves symptoms and quality of life in Bangladeshi IBS patients, with diet adherence as the key predictor of success. Findings support incorporating Low FODMAP education into standard IBS care in Bangladesh.*

Keywords: *Irritable Bowel Syndrome, Low FODMAP diet, Bangladesh, Quality of Life, GIQLI*

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1. *Assistant Professor, Department of Gastroenterology, Medical College for Women's and Hospital, Dhaka, Bangladesh*
2. *Registrar, Department of Internal Medicine, Evercare Hospital, Dhaka, Bangladesh*
3. *Medical Officer, Hi-Care General & Specialized Hospital Ltd., Dhaka, Bangladesh*
4. *Medical Officer, Hi-Care General & Specialized Hospital Ltd., Dhaka, Bangladesh*

INTRODUCTION

Irritable Bowel Syndrome (IBS) is the world's most prevalent functional gastrointestinal disease, with a prevalence of approximately 11% in the world's population [1]. In Bangladesh, the prevalence is found to vary between 8-12%, with higher prevalence in urban areas [2]. Chronic pain in the abdomen, bloating, and alteration of bowel movements are characteristic features of IBS, significantly impairing quality of life and imposing significant economic burdens through healthcare consumption and lost productivity at work [3]. Despite its major impact, management of IBS in Bangladesh remains predominantly symptom-oriented pharmacologic treatment, with less than optimum outcome due to the multifactorial and complicated nature of the disorder. New developments in IBS pathophysiology have reaffirmed the key role played by diet in generating and aggravating symptoms. Of special interest is the recognition of the Low FODMAP (Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols) dietetic method as a very promising evidence-based treatment. This dietetic strategy, launched by Monash University scientists, limits malabsorbed short-chain carbohydrates, which are quickly fermented and induce osmotic symptoms in the intestine [4]. A number of randomized controlled trials have demonstrated that adherence to a Low FODMAP diet can achieve symptom improvement in 50-80% of IBS patients in Western populations, far exceeding usual dietary advice [5]. The mechanism of the therapeutic action of the Low FODMAP diet appears multifactorial. FODMAPs are osmotic substances with high water-holding capacity that pull water into the small intestine and are fermented by bacteria quickly in the gut to form gas. In patients with IBS who are also visceral hypersensitives, these normal physiological mechanisms may induce pain, bloating, and bowel symptom changes [6]. By decreasing systematically these fermentable carbohydrates, the diet addresses an underlying stimulus rather than pharmacologically suppressing symptoms. In spite of robust evidence for this dietary strategy, its adoption in Bangladesh

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has specific issues. Bangladeshi traditional food contains several high-FODMAP ingredients, such as lentils (especially masoor dal), some vegetables (onions, garlic), fruits (mangoes, jackfruit), and wheat-containing foods [7]. In addition, poor awareness among clinicians and lack of culturally tailored dietary guidelines hinder effective implementation. A survey of South Asian gastroenterologists revealed that dietary modification is only first-line treatment recommended by 32% on a regular basis and significantly fewer even specifically recommend restriction of FODMAPs [8]. Current evidence suggests that culturally adapted diet advice significantly improves compliance and outcomes with dietary treatment [9]. Creating Bangladesh-specific Low FODMAP guidelines involves qualitative analysis of typical food habits, identification of suitable substitutes, and feasible adaptation techniques that preserve cultural food choice behaviors while reducing symptomeliciting factors. This approach has particular potential in resource-limited healthcare systems where expensive medications are less available or sustainable over the long term. The possible cost-effectiveness of long-term pharmacotherapy compared with dietary intervention also underlines its relevance to the Bangladeshi healthcare environment. A comprehensive economic analysis from India, a neighboring country, demonstrated that structured dietary management programs for IBS resulted in substantial cost savings compared with conventional medication-based approaches over two years [10]. This review discusses current evidence base in favor of Low FODMAP dietary intervention, reviews its likely usefulness within the unique food and cultural environment of Bangladesh, and provides outlines of designing implementation approaches suitable for this culture. Filling the evidence-to-practice gap of applying nutrition strategy within Bangladesh, this study aims to improve the outcomes of this extensive population afflicted by this challenging condition.

METHODS & MATERIALS

This prospective longitudinal study was conducted at Medical College for Women's and Hospital, Dhaka, Bangladesh between January 2022 and January 2024. A total of 100 adult participants meeting the Rome IV criteria for IBS were recruited and followed over a 12-week period. Baseline data were collected on demographic variables such as age, sex, and IBS subtype (IBS-D, IBS-C, IBS-M). Participants received structured dietary education and individualized Low FODMAP meal planning from a trained dietitian. Throughout the study, adherence to the diet was monitored using weekly self-reported food diaries and categorized as high or low adherence based on predefined criteria. Symptom improvement was assessed at the end of the intervention using standardized symptom questionnaires, while severity levels were tracked from baseline to 12 weeks. Changes in gastrointestinal quality of life were measured using the Gastrointestinal Quality of Life Index (GIQLI) [5], with scores recorded at both time points. Statistical analyses included chi-square tests to determine associations, binary logistic regression to identify predictors of symptom improvement, and Cox proportional hazards modeling to evaluate time to symptom relief. A paired t-test was used to assess changes in GIQLI scores. All statistical tests were two-tailed, and a p-value < 0.05 was considered statistically significant. Statistical analysis was performed using SPSS version 26.

Table – I: Classification and Food Sources of FODMAPs

FODMAP Group	Examples	Common Food Sources
Oligosaccharides	Fructans, Galacto-oligosaccharides (GOS)	Wheat, rye, onions, garlic, legumes
Disaccharides	Lactose	Milk, yogurt, soft cheese
Monosaccharides	Excess fructose	Apples, pears, honey, high-fructose corn syrup
Polyols	Sorbitol, Mannitol	Stone fruits, sugar-free gum, cauliflower

The Low FODMAP diet program is founded on a rigorous three-phase approach: the Elimination Phase (avoidance of high-FODMAP foods completely for 4-6 weeks to permit symptoms to get better), the Reintroduction Phase (stepwise reintroduction of FODMAP groups to identify individual trigger foods and tolerance levels), and the Personalization Phase (instituting an individualized long-term plan in accordance with identified tolerances), with research having demonstrated this process achieves improvement in symptoms in 50-80% of IBS patients when carried out as recommended with a dietitian guiding [6,7].

Table – II: Gastrointestinal Quality of Life Index (GIQLI)

Domain	Number of Items	Topics Covered	Score Range
Physical well-being/Symptoms	19	Abdominal pain, bloating, flatulence, belching, bowel frequency, urgency, incontinence, nausea, blood in stool, heartburn, etc.	0-76
Emotional well-being	6	Coping with illness, sadness, nervousness, frustration, happiness, overall satisfaction	0-24
Social functioning	5	Daily activities, leisure activities, sexual life, interpersonal relationships	0-20
Treatment-related concerns	3	Medical treatment, side effects, physical condition	0-12
Disease-specific items	3	Wake up at night, fatigue, strength	0-12
Total GIQLI Score	36		0-144

Note: Each item is scored on a 5-point Likert scale (0-4), with higher scores indicating better quality of life.

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RESULTS

Table III is the baseline profile of 100 study participants. Age distribution shows even distribution with 25% <30 years, 50% 30–50 years, and 25% >50 years. Participants comprised 40% males and 60% females. According to IBS subtypes, 45% of the participants had diarrhea-predominant IBS (IBS-D), 35% constipation-predominant IBS (IBS-C), and 20% mixed-type IBS (IBS-M). These baseline figures suggest a heterogeneous sample by age, sex, and IBS subtype, allowing for more generalizable assessment of outcomes of dietary intervention. [TABLE III].

Table – III: Baseline Characteristics of Participants (*n* = 100)

Variable	Category	Frequency	Percentage
Age Group	<30 years	25	25%
	30–50 years	50	50%
	>50 years	25	25%
Sex	Male	40	40%
	Female	60	60%
IBS Type	IBS-D	45	45%
	IBS-C	35	35%
	IBS-M	20	20%

70% of 100 patients had improved IBS symptoms following a 12-week low FODMAP diet, while 30% had no improvement. There was a statistically significant association between the diet and symptom improvement by chi-square test (χ^2 = 24.5, p = 0.01), and one may conclude that the low FODMAP diet can be an effective therapeutic option in the treatment of IBS symptoms. [Table IV].

Table – IV: Symptom Improvement after 12 Weeks on Low FODMAP Diet (*n* = 100)

Improvement in IBS Symptoms	Frequency	Percentage
Improved	70	70%
Not Improved	30	30%

This table shows how important adherence was to the efficacy of treatment. Of the 70 high-adherence participants, 60 improved and only 10 did not. Of the 30 low-adherence participants, only 10 improved and 20 did not. The chi-square test (χ^2 = 29.7, p < 0.001) reflects a very strong association between level of adherence and symptom relief and indicates that high adherence to the low FODMAP diet profoundly enhances its clinical effects. [Table V].

Table – V: Adherence to Low FODMAP Diet vs. Symptom Improvement (*n* = 100)

Adherence	Improved (n)	Not Improved (n)	Total	p-value
High Adherence	60	10	70	<0.001
Low Adherence	10	20	30	

**Chi-square test: χ^2 = 29.7, p =0.001 (significant association)*

High adherence to the Low FODMAP diet is a strong predictor of symptom improvement (OR = 9.2), meaning participants with high adherence are 9.2 times more likely to improve compared to those with low adherence. This result is statistically significant (p < 0.001). Age > 50 is not significantly associated with improvement (p = 0.35). Gender (female) is also not a significant predictor (p = 0.31). Having IBS-D (diarrhea-predominant) increases the odds of improvement compared to other IBS types, and this is marginally significant (p = 0.046). [Table VI].

Table – VI: Binary Logistic Regression – Predictors of Symptom Improvement (*n* = 100)

Variable	OR	95% CI	p-value
High Adherence	9.20	3.41–24.81	<0.001
Age > 50	0.60	0.21–1.74	0.35
Female	1.55	0.66–3.61	0.31
IBS-D	2.40	1.01–5.72	0.046

The number of participants with mild symptoms increased from 10 to 40, a 300% improvement, indicating many participants moved from higher severity levels to a milder state. Those with moderate symptoms decreased slightly (from 60 to 45), showing some improvement but also that a portion remained in this category. The severe group was halved, dropping from 30 to 15 participants—a 50% reduction. [Table VII].

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Table – VII: Symptom Severity Scores Before and After Intervention (*n* = 100)

Severity Level	Baseline (n)	After 12 weeks (n)	Percentage Change
Mild	10	40	+300%
Moderate	60	45	-25%
Severe	30	15	-50%

Hazard Ratio (HR) > 1 means faster relief; <1 means slower. Participants with high adherence to the diet experience symptom relief 2.8 times faster than those with low adherence ($p < 0.001$). IBS-D and age over 50 do not significantly affect time to symptom relief. [Table VIII].

Table – VIII: Symptom Severity Scores Before and After Intervention (*n* = 100)

Variable	HR	95% CI	p-value
High Adherence	2.80	1.65–4.75	<0.001
IBS-D	1.40	0.81–2.42	0.22
Age > 50	0.75	0.42–1.34	0.32

Table IX illustrates that there was a considerable improvement in gastrointestinal quality of life following a 12-week low FODMAP diet. The GIQLI score had improved from a mean of 85 ± 12 at baseline to 105 ± 10 following the intervention, with a p-value of <0.001, which was statistically significant. The increase by 20 points was also clinically significant, reflecting better symptom control, decreased discomfort, and improved daily functioning for the patients. These findings reinforce the effectiveness of the low FODMAP diet in improving physical and psychosocial health in IBS patients. [Table IX].

Table – IX: Gastrointestinal Quality of Life Index (GIQLI) Before and After Diet (*n* = 100)

GIQLI Score (Mean ± SD)	Baseline	Week 12	p-value
Total Score	85 ± 12	105 ± 10	<0.001

DISCUSSION

This study demonstrates that a culture-specific Low FODMAP diet yields an impressive symptom and quality of life reduction in Bangladeshi IBS patients with a response rate of 70% comparable to that seen in Western populations. The substantial increase in GIQLI scores (20-point rise, $p<0.001$) emphasizes the impact of the diet on the functional status and well-being of the patients, as was revealed in previous work by Eswaran et al. who likewise found improvements in health-related quality of life outcomes [11, 17]. Our findings regarding the significance of dietary compliance are in line with Harvie et al., who concluded that compliance was the most predictive factor for symptom improvement in the treatment of IBS [12, 18]. The odds ratio of 9.2 for symptom improvement with high compliance is a powerful suggestion of the importance of extensive dietary education and follow-up monitoring. The cultural adaptation of Low FODMAP recommendations to Bangladeshi cuisine most likely contributed to these favorable rates of adherence, supporting Shah et al.'s contention that culturally adapted dietary interventions are optimal in South Asian populations [13, 19]. The differential response between IBS subtypes—with diarrhea-predominant IBS reporting marginally better outcomes (OR=2.40, p=0.046)—is in line with reports by Böhn et al., which observed variability in efficacy according to bowel pattern predominance [14, 20]. This could suggest variability in mechanistic processes of FODMAP sensitivity between IBS phenotypes due to variability in gut microbiota composition and fermentation patterns as outlined by Mars et al. [15, 21]. The rate of symptom resolution observed in our survival analysis, particularly in high-adherence patients (HR=2.80, $p<0.001$), is faster than some Western accounts. Dionne et al. described significant symptom improvement within 3-4 weeks on the diet, whereas our population improved significantly earlier, perhaps because of the higher baseline intake of traditional Bangladeshi diets and therefore more dramatic effects after restriction [16, 22]. The significant decrease in severe symptoms (50% reduction) and shift towards mild symptom categories is a clinically important improvement. Similar changes in symptom categories were reported by Altobelli et al. in their meta-analysis of dietetic interventions for IBS [23]. However, our demonstration here in this study that 30% of subjects had no improvement at all puts McIntosh et al.'s remark about the heterogeneity of IBS pathophysiology and the likelihood that non-FODMAP dietary stimuli or non-dietary stimuli are largely responsible for the generation of symptoms in a proportion of patients [24]. The lack of strong associations between demographic variables (age, gender) and response to treatment is in contrast with observations by Jarrar et al., who reported gender differences in the outcomes of dietary interventions [25]. This difference may be due to cultural differences in dietary habits or reporting styles between study groups. Our results have important implications for IBS treatment in economically disadvantaged healthcare environments. The reported efficacy of diet intervention supports Lacy et al.'s recommendation that pharmacological approaches must constitute second-line treatment for IBS [26]. The return of quality-of-life scores is suggestive of potential cost-effectiveness by conserving healthcare utilization as well as workplace productivity, demonstrated by Kanazawa et al. in the economic assessment of IBS intervention [27]. However, there are some limitations that need to be considered. The single-center environment, the similarly short follow-up period, and self-reported dietary adherence potentially limit generalizability. In addition, Wilson et al. pointed out that dietary interventions are complex with potential placebo effects and numerous confounding variables [28]. Long-term patterns of compliance, microbiome response to dietary intervention in this group, and head-to-head comparison with drug treatment are topics for future studies. Implementation science approaches, as described by Lomer et al., would establish optimal ways to scale up diet-focused interventions within existing healthcare infrastructure [29]. Economic modeling specific to the Bangladeshi health context would complement evidence-based recommendations for health

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policy inclusion of dietitian-managed services in typical IBS care pathways.

Limitation of the study

The study is restricted by its single-center setting, relatively brief follow-up period, and reliance on self-reported measures of dietary compliance. The absence of a control group receiving standard dietary advice does not permit direct comparative efficacy to be assessed, while possible placebo effects and recall bias cannot be excluded.

CONCLUSION

This study confirms that a culturally adapted Low FODMAP diet significantly improves IBS symptoms and quality of life in Bangladeshi patients, and that compliance is the greatest predictor of success. The 70% response rate and positive improvement in GIQLI scores warrant this dietary approach as an effective non-pharmacological option in this population. These findings support the inclusion of Low FODMAP dietitian-led education within standard IBS management pathways in Bangladesh, saving the cost of care while improving patient outcomes via individualized dietetic management.

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