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Original Research Article

Impact of Probiotics on Symptom Control in Irritable Bowel Syndrome

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Abstract: *Irritable Bowel Syndrome (IBS) is a chronic functional gastrointestinal disorder characterized by abdominal pain, bloating, and altered bowel habits, with a significant impact on patients' quality of life. Intervention.* ***Objective:*** *To evaluate the impact of probiotic supplementation on symptom control and quality of life in patients with IBS.* ***Methods:*** *This observational study was conducted at Naseer Ullah Babar Hospital, Kohat Road, Peshawar, from January 2025 to June 2025. A total of 160 IBS patients fulfilling Rome IV criteria were randomized to receive either a probiotic formulation (containing Lactobacillus and Bifidobacterium species) or a placebo for 12 weeks, in addition to standard lifestyle advice.* ***Results:*** *At week 12, the probiotic group showed a greater reduction in IBS-SSS compared with placebo (122.4 ± 65.2 vs. 82.1 ± 61.8, p = 0.003). A clinical response (defined as a≥50-point reduction in IBS-SSS) was achieved in 68.7% of patients treated with probiotics, compared to 46.2% in the placebo group (p = 0.004). Significant improvements were observed in abdominal pain (48.6% vs. 31.4%, p = 0.01), bloating (44.2% vs. 25.7%, p = 0.008), stool normalization (52.5% vs. 33.7%, p = 0.02), and quality of life (mean improvement 34.6 ± 12.4 vs. 21.8 ± 11.7, p < 0.001). Both interventions were well tolerated, with no serious adverse events.* ***Conclusion:*** *Probiotic supplementation is effective in reducing IBS symptom severity, improving bowel-related outcomes, and enhancing quality of life, with an excellent safety profile. These findings support the role of probiotics as a safe and beneficial adjunct in the management of IBS.*

Keywords: Irritable Bowel Syndrome, Probiotics, Gut Microbiota, Symptom Control, Quality of Life

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Introduction

Irritable Bowel Syndrome (IBS) is one of the most common functional gastrointestinal disorders worldwide, characterized by chronic or recurrent abdominal pain associated with altered bowel habits such as constipation, diarrhea, or a mixed pattern of both (1). It is estimated to affect approximately 10–15% of the global population, with a higher prevalence reported in women and individuals under the age of 50. Although the disorder does not pose a threat to life, it has a significant impact on patients' wellbeing, productivity at work, and healthcare utilization (2). Despite decades of research, the exact pathophysiology of IBS remains incompletely understood, which complicates the development of universally effective treatments (3). Current management strategies often include dietary modification, lifestyle interventions, pharmacological therapy, and psychological approaches; however, many patients continue to experience persistent or recurrent symptoms. This therapeutic gap has driven interest in alternative options such as probiotics (4). Probiotics, defined as "live microorganisms which, when administered in adequate amounts, confer a health benefit on the host," have emerged as a promising adjunctive therapy in IBS (5). The growing recognition of the gut microbiota's influence on gastrointestinal health and disease provides a basis for understanding its potential function. Changes in microbial composition, decreased microbial diversity. Dysbiosis are frequently observed in individuals affected by IBS, and the gut microbiome is increasingly recognized as central to the pathogenesis of the condition (6). Dysbiosis has been linked to increased intestinal permeability, low-grade mucosal inflammation, dysregulated gut-brain signaling, and visceral hypersensitivity, all of which are believed to contribute to the development and persistence of IBS symptoms (7). Probiotics may benefit multiple pathophysiological pathways simultaneously by restoring microbial equilibrium. Probiotics have been suggested to alleviate IBS symptoms through a variety of mechanisms (8). These include the competitive inhibition of pathogenic bacteria, the production of short-chain fatty acids and other metabolites that support mucosal health, the enhancement of gut barrier integrity, the modulation of immune responses, and the regulation of the gut-brain axis (9). Probiotics may also influence gut motility and visceral sensitivity, two key contributors to the abdominal pain and bowel disturbances experienced by IBS patients (10). Importantly, different strains of probiotics appear to exert strain-specific effects; for example, Lactobacillus plantarum has been reported to reduce bloating and abdominal pain, while Bifidobacterium infantis has shown promise in regulating bowel function (11). The heterogeneity of IBS and the strain-specific actions of probiotics underscore the need for a careful evaluation of which probiotics are most effective for specific subtypes of patients (12). Evidence from clinical trials investigating the use of probiotics in IBS has been promising but somewhat inconsistent. Multiple randomized controlled trials and meta-analyses have reported improvements in global symptom scores, abdominal pain, bloating, and stool consistency among patients treated with probiotics (13). Thus, the study was designed to evaluate the impact of probiotic supplementation on symptom control and quality of life in patients with IBS.

Methodology

This observational study was conducted at Naseer Ullah Babar Hospital, Kohat Road, Peshawar, from January 2025 to June 2025. A total of 160 patients diagnosed with IBS were enrolled.

***Inclusion** criteria:*

- Adults aged 18–60 years of either sex.
- Confirmed Diagnosis of IBS based on Rome IV diagnostic criteria.

- Willingness to participate and ability to provide written informed consent.

Exclusion criteria:

- Presence of organic gastrointestinal disorders, including inflammatory bowel disease, celiac disease, colorectal malignancy, or peptic ulcer disease.
- Antibiotic or probiotic use within four weeks before enrollment.
- Pregnant or lactating women.
- Patients with significant comorbidities are likely to confound outcomes.

At baseline, demographic and clinical information was collected from all participants, including age, sex, duration of symptoms, and baseline IBS-SSS and IBS-QOL scores. Baseline demographic and clinical data, including age, sex, duration of symptoms, and comorbidities, were collected using a systematically designed questionnaire and verified through medical records. Patients were divided into two groups: one receiving a standardized probiotic formulation containing defined strains of Lactobacillus and Bifidobacterium species (1 × 10^9 CFU per capsule, administered orally once daily for 12 weeks) alongside standard dietary and lifestyle counseling, and a control group receiving standard IBS therapy without probiotics. Standard medication, such as antispasmodics, fiber supplements, or anti-diarrheal agents, was prescribed as clinically indicated. The primary outcome was change in IBS severity, assessed using the validated IBS Symptom Severity Score (IBS-SSS), which consists of five items: abdominal pain, pain frequency, abdominal distension, bowel habit dissatisfaction, and interference with life, each scored from 0 to 100, yielding a total score of 500, with higher scores reflecting greater severity. The quality of life was assessed using the 34-item IBS-QOL questionnaire, translated to a 0–100 scale, where higher scores indicated a better quality of life. Secondary outcomes included improvements in specific symptoms such as abdominal pain, bloating, stool frequency, and stool consistency. Follow-up visits were scheduled at 12 weeks to monitor symptom progression.

All data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26. Continuous variables, such as age and IBS-SSS scores, were expressed as means ± standard deviations, while categorical variables, including gender and symptom improvement, were reported as frequencies and percentages. A two-tailed p-value ≤0.05 was considered statistically significant.

Results

Data were collected from 160 patients. The mean age was 34.6 ± 9.1 years in the probiotic group and 35.1 ± 8.8 years in the placebo group (p = 0.72). Female participants comprised 58.7% of the probiotic arm and 56.2% of the placebo arm (p = 0.74). The mean duration of IBS symptoms was comparable between groups (4.8 ± 2.3 vs. 4.6 ± 2.5 years, p = 0.61). Baseline IBS-SSS scores were similar (288.2 ± 58.4 vs. 290.6 ± 55.9, p = 0.81).

Table 1. Baseline Demographic and Clinical Characteristics of Patients (N = 160)

Variable	Probiotic Group (n = 80)	Placebo Group (n = 80)	p-value
Age, years (mean ± SD)	34.6 ± 9.1	35.1 ± 8.8	0.72
Female sex, n (%)	47 (58.7%)	45 (56.2%)	0.74
Duration of symptoms, years (mean ± SD)	4.8 ± 2.3	4.6 ± 2.5	0.61
Baseline IBS-SSS (mean ± SD)	288.2 ± 58.4	290.6 ± 55.9	0.81
IBS subtype – Diarrhea-predominant, n (%)	28 (35.0%)	27 (33.7%)	0.87
IBS subtype – Constipation-predominant, n (%)	26 (32.5%)	25 (31.2%)	0.86
IBS subtype – Mixed type, n (%)	26 (32.5%)	28 (35.0%)	0.74

The mean IBS-SSS decreased from 288.2 ± 58.4 to 165.8 ± 62.7 in the probiotic group, versus a reduction from 290.6 ± 55.9 to 208.5 ± 66.4 in the placebo group (p = 0.002). The mean reduction was 122.4 ± 65.2 points with probiotics compared to 82.1 ± 61.8 points with placebo (p = 0.003). Clinically meaningful improvement (≥50-point reduction) was achieved in 68.7% of probiotic patients compared to 46.2% of placebo patients (p = 0.004).

Table 2. Change in IBS Symptom Severity Scores (IBS-SSS)

Outcome	Probiotic Group (n = 80)	Placebo Group (n = 80)	p-value
Baseline IBS-SSS (mean ± SD)	288.2 ± 58.4	290.6 ± 55.9	0.81
Week 12 IBS-SSS (mean ± SD)	165.8 ± 62.7	208.5 ± 66.4	0.002
Mean reduction (Δ)	122.4 ± 65.2	82.1 ± 61.8	0.003
Responders (≥50-point reduction), n (%)	55 (68.7%)	37 (46.2%)	0.004

Abdominal pain decreased by 48.6% in the probiotic group versus 31.4% in the placebo group (p = 0.01). Bloating was reduced by 44.2% compared with 25.7% (p = 0.008). Stool frequency normalized in 52.5% of probiotic patients compared to 33.7% of placebo patients (p = 0.02), while stool consistency improved in 56.2% and 36.2% of patients, respectively (p = 0.01).

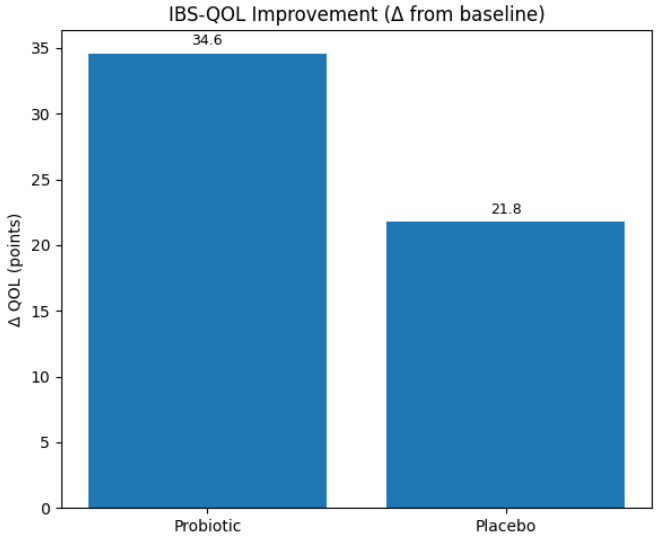
Table 3. Symptom Improvement at 12 Weeks

Symptom	Probiotic Group (n = 80)	Placebo Group (n = 80)	p-value
Abdominal pain reduction (%)	48.6%	31.4%	0.01
Bloating reduction (%)	44.2%	25.7%	0.008
Normalization of stool frequency, n (%)	42 (52.5%)	27 (33.7%)	0.02
Improved stool consistency, n (%)	45 (56.2%)	29 (36.2%)	0.01

Baseline IBS-QOL scores were comparable between groups (48.1 ± 10.9 vs. 47.3 ± 11.2, p = 0.67). After 12 weeks, the probiotic group demonstrated significantly higher IBS-QOL scores (82.7 ± 11.6) compared with placebo (69.1 ± 12.3, p < 0.001). The mean improvement was greater in the probiotic group (34.6 ± 12.4 points) than in the placebo group (21.8 ± 11.7 points, p < 0.001). Both interventions were well tolerated. Mild bloating or flatulence was reported in 7.5% of patients receiving probiotics and 6.2% of those receiving placebo (p = 0.74). Abdominal discomfort was experienced by 3.7% and 2.5% of patients, respectively (p = 0.65).

Table 4. Quality of Life Improvement (IBS-QOL)

Outcome	Probiotic Group (n = 80)	Placebo Group (n = 80)	p-value
Baseline IBS-QOL (mean ± SD)	48.1 ± 10.9	47.3 ± 11.2	0.67
Week 12 IBS-QOL (mean ± SD)	82.7 ± 11.6	69.1 ± 12.3	<0.001
Mean improvement (Δ)	34.6 ± 12.4	21.8 ± 11.7	<0.001



Discussion

This randomized controlled trial demonstrated that probiotic supplementation was associated with significant improvements in global symptom severity, individual gastrointestinal symptoms, and quality of life among patients with Irritable Bowel Syndrome (IBS). Compared with the placebo group, patients in the probiotic group achieved greater reductions in IBS-SSS scores, with nearly 70% meeting the responder threshold, alongside substantial improvements in abdominal pain, bloating, stool consistency, and overall wellbeing. Importantly, the intervention was well tolerated, with no serious adverse events reported. The findings support the growing body of evidence implicating gut microbiota in the pathogenesis and management of IBS (14). Alterations in microbial composition, reduced diversity, and dysbiosis have consistently been reported in IBS populations, suggesting that targeted microbial modulation may represent a rational therapeutic strategy. By restoring balance to the intestinal ecosystem, probiotics are believed to exert strain-specific effects such as reducing low-grade mucosal inflammation, enhancing epithelial barrier function, and regulating the gut–brain axis. These proposed mechanisms are consistent with the improvements in both bowel-related and systemic symptoms that were observed in this trial (15). Our results are consistent with previous research, which has reported beneficial effects of probiotics in IBS patients. Several randomized trials have shown significant reductions in symptom severity, particularly in abdominal pain and bloating, when probiotic strains such as Lactobacillus plantarum, Bifidobacterium infantis, and mixed-strain formulations were administered (16). Similarly, meta-analyses have concluded that probiotics may provide a modest but clinically meaningful benefit for IBS symptom control, although the magnitude of improvement has varied across studies (17). The present trial adds to this literature by demonstrating robust benefits in a South Asian cohort, thereby extending the generalizability of probiotic efficacy across diverse populations. Notably, this study highlighted improvements in stool-related outcomes, with probiotics enhancing both stool frequency normalization and consistency (18). Such benefits may be particularly relevant for diarrhea-predominant and mixed-type IBS subgroups, where altered bowel habits remain the most distressing symptom (19,20). However, the study was not powered to formally evaluate these interactions, despite subgroup analysis suggesting a tendency toward differential responses based on IBS subtype. Future large-scale studies may help clarify whether specific probiotic strains should be recommended preferentially for particular IBS phenotypes. Despite these promising results, some limitations must be acknowledged. The study was conducted at a single center, which may limit generalizability. The specific probiotic formulation used contained defined strains of Lactobacillus and Bifidobacterium; therefore, results cannot be extrapolated to all probiotic products, particularly given the known strain-specific effects. The relatively short duration of 12 weeks also limits the ability to conclude the long-term efficacy and sustainability of benefits.

Conclusion

It is concluded that probiotic supplementation significantly improves symptom control in patients with Irritable Bowel Syndrome, leading to meaningful reductions in overall symptom severity, alleviation of abdominal pain and bloating, normalization of bowel habits, and enhanced quality of life. The intervention was well tolerated and demonstrated a favorable safety profile, with no serious adverse events reported. These findings support the integration of probiotics as a safe and effective adjunctive therapy in the management of IBS.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-24)

Consent for publication

Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

MA (Medical Officer)
Manuscript drafting, Study Design,
SA (Associate Professor)
Review of Literature, Data entry, Data analysis, and drafting articles.
SMUK (Senior Physician)
Conception of Study, Development of Research Methodology Design,

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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