

<https://doi.org/10.48047/AFJBS.6.8.2024.3745-3751>



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>



Research Paper

Open Access

Dietary Patterns and Their Impact on Irritable Bowel Syndrome (IBS) Symptoms in Young Adults

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Volume 6, Issue 8, Aug 2024

Received: 26 May 2024

Accepted: 03 Aug 2024

Published: 30 Aug 2024

[doi:10.48047/AFJBS.6.8.2024.3745-3751](https://doi.org/10.48047/AFJBS.6.8.2024.3745-3751)

ABSTRACT

Background

Irritable Bowel Syndrome (IBS) is a common functional gastrointestinal disorder characterized by abdominal pain, bloating, and altered bowel habits. Dietary patterns play a crucial role in symptom severity, yet their impact remains underexplored in young adults.

Objective

This study aimed to evaluate the association between different dietary patterns and IBS symptom severity in young adults.

Methodology

A cross-sectional study was conducted at the Medical Teaching Institute, Khalifa Gul Nawaz Teaching Hospital, Bannu, from May 1, 2023, to April 30, 2024. A total of 90 IBS patients were enrolled. Dietary patterns were categorized as Western diet, Mediterranean diet, Low-FODMAP diet, and Traditional Pakistani diet. IBS symptom severity was assessed using the IBS Symptom Severity Score (IBS-SSS). Statistical analyses included Chi-square tests, ANOVA, multiple logistic regression, and Pearson correlation analysis, using SPSS version 26.0.

Results

The Western diet was associated with the highest IBS severity scores (280.6 ± 50.2 , $p = 0.003$), while the Low-FODMAP diet had the lowest (150.3 ± 42.8). A significant positive correlation was found between processed food consumption and IBS severity ($r = 0.52$, $p < 0.001$), while fiber intake showed a negative correlation ($r = -0.45$, $p = 0.001$). Multiple logistic regression analysis confirmed that stress levels and physical activity influenced dietary impact on IBS severity.

Conclusion

Dietary patterns significantly influence IBS symptom severity, with Western diets exacerbating symptoms, while Mediterranean and Low-FODMAP diets show a protective effect. These findings highlight the importance of dietary modifications in IBS management and support the need for personalized nutrition strategies for symptom relief.

Keywords

Irritable Bowel Syndrome, Dietary Patterns, IBS Severity, Western Diet, Low-FODMAP Diet, Mediterranean Diet, Young Adults, Nutrition.

INTRODUCTION

Irritable Bowel Syndrome (IBS) is a chronic functional gastrointestinal disorder characterized by abdominal pain, bloating, and altered bowel habits, including diarrhea (IBS-D), constipation (IBS-C), or a mix of both (IBS-M).[1] It is a prevalent condition worldwide, affecting approximately 10–15% of the population, with a higher incidence in young adults.[2] Despite its widespread occurrence, IBS remains a challenging condition due to its multifactorial etiology, involving gut-brain interactions, visceral hypersensitivity, gut microbiota alterations, and dietary triggers.[3] Among these, dietary factors play a crucial role in symptom modulation, as food intake can either alleviate or exacerbate IBS symptoms in susceptible individuals.[4]

Dietary patterns, which refer to the habitual consumption of specific food groups and nutrients over time, have been extensively studied concerning IBS.[5] Unlike individual food components, dietary patterns provide a broader perspective on the cumulative impact of diet on gastrointestinal health.[6] Several dietary interventions, including the low-FODMAP diet, Mediterranean diet, and Western diet, have been evaluated for their effects on IBS symptoms, with varying degrees of success.[7] The low-FODMAP diet, which restricts fermentable oligosaccharides, disaccharides, monosaccharides, and polyols, has been widely recognized for its efficacy in reducing IBS symptoms by minimizing gut fermentation and gas production.[8] However, its long-term sustainability and impact on gut microbiota remain areas of concern.

Conversely, the Western diet, characterized by high consumption of processed foods, refined sugars, and unhealthy fats, has been associated with increased inflammation and gut dysbiosis, potentially exacerbating IBS symptoms.[9] On the other hand, the Mediterranean diet, rich in fiber, antioxidants, and omega-3 fatty acids, has been suggested to have a protective role against IBS by promoting gut microbiota diversity and reducing intestinal inflammation.[10] These dietary patterns highlight the complexity of diet-IBS interactions and the need for personalized nutritional approaches.

Young adults, particularly college students and working professionals, often experience irregular eating habits, high consumption of fast foods, and psychological stress, all of which contribute to IBS symptom severity.[11] Lifestyle factors, including meal timing, hydration, and stress management, further influence gastrointestinal health, making dietary interventions a key component of IBS management in this demographic. Given the impact of dietary patterns on IBS, further research is warranted to explore individualized nutritional strategies that can effectively alleviate symptoms and improve the quality of life in young adults. The present study aims to evaluate the impact of various dietary patterns on IBS symptoms, focusing on their mechanisms of action, efficacy, and practical implications for young adults.

METHODOLOGY

This cross-sectional observational study was conducted to evaluate the impact of dietary patterns on irritable bowel syndrome (IBS) symptoms in young adults. A cross-sectional study design was chosen as it allows for assessing dietary intake and symptom severity at a single point in time, providing insights into potential associations between diet and IBS manifestations. The study was conducted at the Medical Teaching Institute, Khalifa Gul Nawaz Teaching Hospital, Bannu, a tertiary care hospital catering to a diverse population with gastrointestinal disorders. The study spanned one year, from 1st May 2023 to 30th April 2024, and included a total of 90 IBS patients. A non-probability consecutive sampling technique was used to recruit participants, ensuring that all eligible IBS patients presenting to the Gastroenterology Outpatient Department (OPD) during the study period were included until the required sample size was achieved. Inclusion criteria for the study comprised young adults aged 18 to 40 years, diagnosed with IBS based on Rome IV criteria, and experiencing symptoms for at least six months prior to enrollment. Only patients willing to provide written informed consent were included. The exclusion criteria involved patients with organic gastrointestinal diseases (such as Crohn's disease, ulcerative colitis, and

celiac disease), a history of gastrointestinal surgery (except appendectomy), severe psychiatric illnesses, pregnant or lactating women, and individuals on long-term antibiotics, probiotics, or prebiotics. Additionally, individuals with severe dietary restrictions due to religious, medical, or personal reasons were excluded.

Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Khalifa Gul Nawaz Teaching Hospital, Bannu. Participants were informed about the objectives of the study, and their confidentiality and anonymity were maintained throughout the research. Data collection was performed using a structured questionnaire, which included three main sections: demographic data, IBS symptom severity assessment, and dietary intake evaluation. Demographic data collected included age, gender, weight, height, BMI, occupation, socioeconomic status, and lifestyle habits such as smoking and physical activity levels. IBS symptoms were assessed using the Irritable Bowel Syndrome Symptom Severity Score (IBS-SSS), a validated tool that quantifies pain intensity, pain frequency, bloating severity, and bowel habit dissatisfaction.[12]

Dietary intake was assessed using a Food Frequency Questionnaire (FFQ), which captured habitual dietary patterns over the past one month.[13] Participants were classified into different dietary pattern groups, including the Western Diet (high in processed foods, unhealthy fats, and refined sugars), the Mediterranean Diet (rich in fiber, antioxidants, lean proteins, and olive oil), the Low-FODMAP Diet (which restricts fermentable oligosaccharides, disaccharides, monosaccharides, and polyols), and the Traditional Pakistani Diet (characterized by high consumption of spices, lentils, wheat-based foods, and dairy). Information regarding meal frequency, hydration status, and specific food triggers (such as caffeine, dairy, and high-fat foods) was also recorded.

To further assess IBS-related symptoms, stool consistency was evaluated using the Bristol Stool Chart, helping to classify patients into different IBS subtypes—IBS-D (diarrhea-predominant), IBS-C (constipation-predominant), and IBS-M (mixed type). Additionally, stress levels were measured using the Perceived Stress Scale (PSS) to evaluate the potential influence of psychological stress on IBS symptoms.[14]

The collected data were analyzed using SPSS version 26.0. Descriptive statistics were used to summarize demographic characteristics and dietary patterns, with mean $\pm$ standard deviation (SD) for continuous variables and frequencies and percentages for categorical variables. To determine the relationship between dietary patterns and IBS severity, Chi-square tests were applied to assess categorical associations, while independent t-tests or ANOVA were conducted to compare IBS severity scores across different dietary groups. Pearson correlation analysis was further used to explore the association between specific dietary components (such as fiber intake and processed food consumption) and IBS symptom severity. $P < 0.05$ was taken as significant.

RESULTS

The study included 90 participants with a mean age of 27.8 ± 5.4 years. The majority of the participants were female (57.8%), while 42.2% were male. The mean BMI was 23.6 ± 3.1 kg/m². In terms of socioeconomic status, most participants belonged to the middle-income group (53.3%), while low and high socioeconomic groups each accounted for 23.3%. Regarding physical activity levels, 45.6% were sedentary, 38.9% had moderate activity, and only 15.6% were classified as active. The mean stress level, measured using the Perceived Stress Scale (PSS), was 18.9 ± 4.2 . (Table 1)

Table 1: Demographic Characteristics of the Study Population (N = 90)

Variable	Mean $\pm$ SD / n (%)
Age (years)	27.8 ± 5.4
Gender	

Male	38 (42.2%)
Female	52 (57.8%)
BMI (kg/m²)	23.6 ± 3.1
Socioeconomic Status	
Low	21 (23.3%)
Middle	48 (53.3%)
High	21 (23.3%)
Physical Activity Level	
Sedentary	41 (45.6%)
Moderate	35 (38.9%)
Active	14 (15.6%)
Stress Levels (PSS Score)	18.9 ± 4.2

Among the participants, the most common IBS subtype was IBS-D (diarrhea-predominant), affecting 41.1%, followed by IBS-C (32.2%) and IBS-M (mixed-type) (26.7%).(Table 2) When assessing dietary patterns, 36.7% of participants followed a Western diet, while 24.4% adhered to a Mediterranean diet, 21.1% followed a low-FODMAP diet, and 17.8% consumed a Traditional Pakistani diet.(Table 3)

Table 2: Distribution of IBS Subtypes among Participants

IBS Subtype	n (%)
IBS-D (Diarrhea-predominant)	37 (41.1%)
IBS-C (Constipation-predominant)	29 (32.2%)
IBS-M (Mixed-type)	24 (26.7%)

Table 3: Dietary Patterns among Participants (N = 90)

Dietary Pattern	n (%)
Western Diet	33 (36.7%)
Mediterranean Diet	22 (24.4%)
Low-FODMAP Diet	19 (21.1%)
Traditional Pakistani Diet	16 (17.8%)

A comparison of IBS symptom severity scores (IBS-SSS) across dietary groups showed a statistically significant difference ($p = 0.003$). Participants consuming a Western diet had the highest IBS-SSS (280.6 ± 50.2), indicating more severe symptoms, while those following a Mediterranean diet (180.5 ± 45.6) and Low-FODMAP diet (150.3 ± 42.8) exhibited lower severity scores. The Traditional Pakistani diet group had an intermediate score of 220.4 ± 47.9 . (Table 3)

Table 4: Mean IBS Symptom Severity Score by Dietary Pattern

Dietary Pattern	IBS-SSS (Mean ± SD)	p-value (ANOVA)
Western Diet	280.6 ± 50.2	0.003 (significant)
Mediterranean Diet	180.5 ± 45.6	
Low-FODMAP Diet	150.3 ± 42.8	
Traditional Pakistani Diet	220.4 ± 47.9	

Further chi-square analysis revealed a significant association between dietary patterns and IBS severity ($p = 0.002$). The Western diet group had the highest proportion of severe IBS cases (55.2%), whereas the Mediterranean and Low-FODMAP diets had a greater proportion of participants with mild IBS (41.7% and 33.3%, respectively).(Table 5)

Table 5: Association between Dietary Patterns and IBS Severity

Dietary Pattern	Mild IBS (n=24)	Moderate IBS (n=37)	Severe IBS (n=29)	p-value
Western Diet	3 (12.5%)	14 (37.8%)	16 (55.2%)	0.002 (significant)
Mediterranean Diet	10 (41.7%)	8 (21.6%)	4 (13.8%)	
Low-FODMAP Diet	8 (33.3%)	7 (18.9%)	4 (13.8%)	
Traditional Pakistani Diet	3 (12.5%)	8 (21.6%)	5 (17.2%)	

In assessing specific dietary components and their correlation with IBS severity, a significant negative correlation ($r = -0.45$, $p = 0.001$) was observed between fiber intake and IBS severity, suggesting that higher fiber intake was associated with lower symptom severity. Conversely, processed food consumption was positively correlated with IBS severity ($r = 0.52$, $p < 0.001$), indicating that frequent consumption exacerbated symptoms. Dairy intake also showed a significant positive correlation ($r = 0.38$, $p = 0.004$), linking higher dairy consumption to increased IBS severity. Additionally, hydration levels demonstrated a mild but significant negative correlation ($r = -0.30$, $p = 0.02$), indicating that greater water intake was associated with reduced symptom severity.

Table 6: Pearson Correlation between Dietary Components and IBS Severity Score

Dietary Component	Pearson Correlation (r)	p-value
Fiber Intake (g/day)	-0.45 (Negative correlation)	0.001 (significant)
Processed Food Consumption (times/week)	+0.52 (Positive correlation)	<0.001 (significant)
Dairy Intake (times/week)	+0.38 (Positive correlation)	0.004 (significant)
Hydration (Liters/day)	-0.30 (Negative correlation)	0.02 (significant)

DISCUSSION

The findings of this study highlight the significant influence of dietary patterns on IBS symptom severity in young adults. The Western diet was associated with the highest IBS severity scores, while the Mediterranean and Low-FODMAP diets were linked to milder symptoms. These results align with previous studies that have demonstrated a strong correlation between dietary choices and IBS symptomatology. A study by Wang J, et al. (2021) found that individuals following a Low-FODMAP diet experienced a significant reduction in IBS symptoms compared to those on a traditional diet, which is consistent with our findings where the Low-FODMAP group had the lowest IBS severity scores.[7] Similarly, a study by Kasti A, et al. (2022) reported that the Mediterranean diet, rich in fiber and antioxidants, was associated with improved gut health and reduced inflammation, which could explain the lower IBS severity observed in participants consuming this diet in our study.[15]

In contrast, our study found that individuals consuming a Western diet, characterized by high intake of processed foods, refined sugars, and unhealthy fats, exhibited significantly more severe IBS symptoms. This is supported by research conducted by Gubatan J, et al. (2023), which found that a diet high in ultra-processed foods and saturated fats contributes to increased gut inflammation and dysbiosis, exacerbating IBS symptoms.[16] The positive correlation between processed food consumption and IBS severity ($r = 0.52$, $p < 0.001$) in our study further reinforces

the hypothesis that diets rich in preservatives, additives, and low fiber can aggravate IBS symptoms.

Moreover, the negative correlation between fiber intake and IBS severity ($r = -0.45$, $p = 0.001$) in our study supports the well-established role of dietary fiber in promoting gut health. Di Rosa C et al. (2023) reported that higher fiber intake is linked to improved stool consistency and reduced gut transit time, particularly benefiting individuals with IBS-C.[17] However, our findings also align with studies that indicate that excessive fiber intake, particularly from fermentable fibers, may exacerbate bloating and discomfort in IBS-D patients.[18, 19] This could explain why the Mediterranean diet, which contains moderate fiber from fruits, vegetables, and whole grains, was beneficial, while extreme fiber intake patterns could have mixed effects.

Dairy consumption was another factor influencing IBS severity in our study, showing a significant positive correlation with symptom severity ($r = 0.38$, $p = 0.004$). This is consistent with findings from Alkalay MJ et al. (2022), which highlighted that lactose intolerance is highly prevalent in IBS patients, leading to worsened symptoms such as bloating, cramps, and diarrhea.[20] Many IBS patients have difficulty digesting lactose due to reduced lactase enzyme activity, leading to increased gas production and altered bowel habits. This explains why participants following a low-FODMAP diet, which restricts dairy intake, had the lowest IBS severity scores in our study.

Hydration also emerged as an important factor influencing IBS symptoms. Our study found a negative correlation between hydration levels and IBS severity ($r = -0.30$, $p = 0.02$), suggesting that higher water intake may contribute to symptom relief. This finding aligns with Okawa Y. et al. (2023), who reported that adequate hydration aids digestion, prevents constipation, and improves gut motility.[21] The beneficial effects of hydration may be particularly relevant for individuals with IBS-C, as increased fluid intake can enhance stool consistency and ease passage.

The present study contributes to the growing body of evidence emphasizing the role of dietary modifications in IBS management. However, it is important to acknowledge potential limitations. The cross-sectional nature of the study prevents the establishment of causality, and self-reported dietary patterns may introduce recall bias. Future longitudinal and interventional studies are needed to further explore the effectiveness of dietary interventions in IBS management.

CONCLUSION

This study demonstrates that dietary patterns significantly impact IBS symptom severity in young adults, with the Western diet being associated with more severe symptoms, while Mediterranean and low-FODMAP diets were linked to lower symptom severity. Increased processed food and dairy consumption correlated with worse IBS symptoms, whereas fiber intake and hydration had a protective effect. These findings emphasize the need for dietary modifications as a non-pharmacological approach to IBS management, suggesting that a personalized, nutrient-dense diet may help alleviate symptoms and improve quality of life in IBS patients. Future studies should focus on long-term dietary interventions and their effects on gut microbiota and inflammation in IBS populations.

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