Original Article

Prevalence, Symptom Severity and Risk Factors Associated With Irritable Bowel Syndrome in MBBS Students of Nishtar Medical University, Multan

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ABSTRACT

Background: Irritable bowel syndrome (IBS) is a common functional gastrointestinal disorder characterized by recurrent abdominal pain and altered bowel habits without structural abnormalities. Globally, its prevalence ranges from 10–15%, and in Asia from 6.8–33.3%. Medical students are at higher risk due to academic stress, poor sleep, and psychological factors. Studies report associations of IBS with anxiety, depression, physical and academic stress, sleep disturbances, and early life trauma. The objective of this study was to determine the prevalence, subtypes, symptom severity, and associated factors of IBS among MBBS students at Nishtar Medical University, Multan.

Methodology: This cross-sectional study was conducted from October 2023 to April 2024 in the Department of Community Medicine, Nishtar University Multan. Sample size (n = 78) was calculated using Epi Info sample size calculator with 95% confidence limits. MBBS students from first to final year were included; those with red flag symptoms or known organic gastrointestinal diseases were excluded. Ethical approval was obtained from the Institutional Ethical Review Board. Data were collected via validated self-administered questionnaires, including socio-demographics, Rome IV criteria for IBS, IBS Symptom Severity Scale (SSS), Pittsburgh Sleep Quality Index (PSQI), Hospital Anxiety and Depression Scale (HADS), Childhood Trauma Questionnaire (CTQ), and Student Stress Inventory (SSI). Associations were analyzed using chi-square tests and multivariate logistic regression ($p<0.05$).

Results: IBS prevalence was 39.7%, with mixed subtype (48.4%) and mild severity (51.6%) most common. Significant associations were observed with past history of IBS ($p = 0.001$), effect on grades ($p = 0.010$), physical stress ($p = 0.0004$), academic stress ($p = 0.005$), anxiety ($p = 0.003$), depression ($p = 0.002$), poor sleep ($p = 0.014$), physical abuse ($p = 0.016$), and emotional neglect ($p = 0.019$). Strongest associations were with past IBS history, poor sleep, and academic impact.

Conclusion: IBS is common among medical students, with psychological and lifestyle factors significantly associated. Early identification of these factors may help reduce symptom burden in high-risk populations.

Keywords: Irritable bowel syndrome; Anxiety; Depression, Medical students

INTRODUCTION

Irritable bowel syndrome (IBS) is a common disorder of gut-brain interactions comprising recurrent abdominal pain, altered bowel habits and stool consistency.[1] The diagnosis is based on clinical findings and the exclusion of other organic disorders.[1,2] IBS is prevalent in about 10% to 15% of the world's population, and in Asia, about 6.8% to 33.3% of people suffer from IBS.[1] In Pakistani medical students, a study shows a prevalence of 60%.[3] There is a greater predilection of IBS towards females than males.[2] ROME IV is an updated diagnostic criteria for functional gastrointestinal disorders (FGDs) like irritable bowel syndrome; persons having recurrent abdominal pain on average at least one day per week during the previous three months associated with two or more of the presentations: related to defecation (pain may be increased or unaltered by defecation), related with a change in stool frequency, related with a change in stool form (appearance).[4,5] The criteria must be fulfilled for the last 3 months with the onset of symptoms at least 6 months before diagnosis. It has 4 subtypes based on patient perception of the usual consistency of abnormal stools: IBS-C (constipation), IBS-D (diarrhea), IBS-M (mixed), IBS-U (unspecified). As far as the pathophysiology of IBS is concerned, it is complex and not well understood. However, genetic predisposition, post-infectious IBS, visceral hypersensitivity, autoimmune factors, gut microbial alteration and psychological comorbidities are

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different explanatory mechanisms.[6] There is conspicuous heterogeneity in epidemiological studies of IBS.[6] Studies have shown strong association of multiple risk factors with IBS development like gender, lifestyle, dietary habits, physical activity, stress, poor sleep quality, and psychological disorders.[7] Anxiety, depression and early adverse life events are also set up to be related to the onset of IBS.[8]

In Pakistan, there is limited data available on the particular risk factors that contribute to the development of IBS. The aims of this study were to determine the prevalence of IBS in medical students based on Rome IV criteria and to assess various types, symptom severity and risk factors associated with IBS.

METHODOLOGY

This cross-sectional study was conducted over a 7-month period from October 2023 to April 2024 in the Department of Community Medicine at Nishtar Medical University, Multan, Pakistan. The study protocol was approved by the Institutional Ethical Review Board of Nishtar Medical University (Ref. No.: 13131/ NMU; August 28, 2023). This study included MBBS students from the first year to the final year. Participants who self-reported any red-flag symptoms or known organic diseases were excluded from the study. The red flag symptoms include a history of rectal bleeding or melena; unexplained recent weight loss; and family history of inflammatory bowel disease or colorectal cancer. The list of self-reported organic diseases includes inflammatory bowel disease (Crohn's disease or ulcerative colitis), colorectal cancer, celiac disease, and lactose intolerance. Informed consent was obtained from all participants before data collection. Sample size was calculated using the Epi-Info software from the CDC, assuming a hypothesized prevalence of 5.57% based on a recent study on the prevalence of irritable bowel syndrome among medical students in Pakistan,[8] with 95% confidence level (formula: $N = Z^2P(1-P)/d^2$).[6] All participants were selected through simple random sampling. Data were collected using validated questionnaires in printed form. A structured questionnaire was used to assess socio-demographic data BMI categories (underweight: less than 18.5, normal weight: between 18.5 and 24.9, overweight: between 25 and 29.9, obese: 30 or greater), dietary information relating to intakes of fats, proteins, and carbohydrate foods, and whether or not they follow particular dietary regimens; and any current or past diagnoses of medical conditions such as IBS, other gastrointestinal infections, and their personal and family histories of IBS. Rome IV criteria was used for diagnosis of IBS based on the presence of recurrent abdominal pain on average at least 1 day/week in the last 3 months, associated with two or more of the following criteria: 1. Related to defecation 2. Associated with a change in frequency of stool 3. Associated with a change in form of stool. Bristol stool scale was used to define abnormal stools and classify patients with IBS into diarrhea predominant IBS (IBS-D), constipation predominant (IBS-C), mixed IBS (IBS-M) and unclassified IBS (IBS-U). IBS symptom severity scale (SSS) was used to assess mild, moderate and severe IBS. It includes 5 items and each item has a 100-point scale from 20 to 100 score. The sum of scores of five items reflects total severity classified as mild (75-175), moderate (175-300) and severe (>300) [4,5] Pittsburgh Sleep Quality Index (PSQI): For the assessment of sleep quality, PSQI was used.[9] In scoring the PSQI, seven component scores were derived, each scored 0 (no difficulty) to 3 (severe difficulty). The component scores were summed to produce a global score (range 0 to 21). A total score >5 indicated poor sleep quality.

For the assessment of anxiety and depression, Hospital Anxiety and Depression (HADS) scale was used.[10] It was a self-administered questionnaire comprised of 14 questions, seven questions for anxiety and seven questions for depression scored on the basis of a four-point Likert scale ranging from 0 (not present) and 3 (considerable). Scores of 0-7 were considered normal, 8-10 borderline abnormal and 11 or over abnormal. Child Trauma Questionnaire (CTQ) - Short form is a 28 items questionnaire, was developed by Bernstein et al.[11] It is comprised of five subscales (emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect, to determine the degree of child trauma (one type of early adverse life events) and three items for validity evaluation. Each subscale had a score of 1 to 5; the total score ranged from 25 to 125. Student Stress Inventory (SSI) was used to measure the level of stress among students.[12] It contained 40 negative items for each subscale of stress: physical stress, interpersonal relationship stress, academic stress and environmental stress. Each item was scored from 1 to 4. A total score of 40-80 reflected mild stress, 81-121 moderate stress and 122-160 severe stress.

All the data was analyzed using SPSS version 27.0.1. Frequencies and percentages were calculated for the categorical variables. The chi-square test or Fisher's exact test were used to determine any significant differences in IBS and non-IBS participants A p-value less than 0.05 was taken as significant. Multivariate analysis using binary logistic regression was used to evaluate the association of various risk factors associated with irritable bowel syndrome.

RESULTS

The mean age of the participants was of 22 years. Among

them, males were 30(38.5%) and females were 48 (61.5%). Underweight students comprised 11 (14.1%), overweight students were 7 (8.9%), while 60 (76.9%) had a normal body mass index. The demographic characteristics, past history, family history, traveler's diarrhea, food allergy and dietary habits are listed in Tables 1 and 2. It is evident that there is no significant difference in these factors between IBS and non-IBS participants except in the past history of IBS and high fat diet. Out of 78 participants, IBS criteria was fulfilled by 31, with a prevalence of 39.7%. For females, the prevalence was 43.8% and for males, 33.3%. Among the IBS patients, 48.4% were IBS-M, 29% were IBS-D, 16.1% were IBS-C and 6.5% were IBS-U. In both males and females, IBS-M was the predominant subtype about 50% in males and 47.6% in females. Out of the 31 IBS patients, 51.6% were mild IBS, 39.9% had moderately severe IBS and 9% had severe form of IBS.

Table 3 shows a statistically significant difference regarding anxiety and depression in IBS cases and normal participants (p values <0.003 and <0.002 respectively). There is a statistically significant difference regarding physical stress and academic stress in SSI subscales for IBS and non-IBS participants (p-values 0.0004 and 0.005 respectively).

Table 4 shows a statistically significant difference for PSQI in students with or without IBS (p-value 0.014). There is a statistically significant difference regarding physical abuse and emotional neglect in CTQ subscales for IBS and non-IBS participants (p-values 0.016 and 0.019 respectively).

Table 5 shows multivariate logistic regression analysis for assessing the association of risk factors for IBS. IBS is significantly associated with PSQI, past history of IBS and effect on grades with p-values 0.031, 0.003 and 0.010 respectively.

Table 1: Sociodemographic features of participants

Characteristics	Total	IBS n (%)	Non-IBS n (%)	Chi-square	p-value
Age groups (years)					
19-21	21	5 (23.8)	16 (76.2)	5.393	0.067
22-23	51	25 (49.0)	26 (51.0)		
24-25	6	1 (16.7)	5 (83.3)		
Gender					
Male	30	10 (33.3)	20 (66.7)	0.836	0.360
Female	48	21 (43.8)	27 (56.3)		
Body mass index					
Underweight	11	5 (45.5)	6 (54.5)	2.422	0.298
Normal	60	25 (41.7)	35 (58.3)		
Overweight	7	1 (14.3)	6 (85.7)		
Having breakfast					
Always	39	13 (33.3)	26 (66.7)	4.365	0.113
Sometimes	23	8 (34.8)	15 (65.2)		
Rarely	16	10 (62.5)	6 (37.5)		
Chewing process					
Eating slowly	23	8 (34.8)	15 (65.2)	2.177	0.337
Normal	41	15 (36.6)	26 (63.4)		
Eating fast	14	8 (57.1)	6 (42.9)		
Regular physical activity					
Yes	42	16 (38.1)	26 (61.9)	0.008	0.929
No	36	15 (41.7)	21 (58.3)		
Cold drinks with meals					
Yes	27	10 (37)	17 (63)	0.013	0.911
No	51	21 (41.2)	30 (58.8)		
Past history of IBS					
Yes	15	12 (80)	3 (20)	10.572	0.001
No	63	19 (30.2)	44 (69.8)		
Family history of IBS					
Yes	11	7 (63.6)	4 (36.4)	3.053	0.081
No	67	24 (35.8)	43 (64.2)		
Traveler's diarrhea					
Yes	11	7 (63.6)	4 (36.4)	2.002	0.157
No	67	24 (35.8)	43 (64.2)		
Food allergy					
Yes	9	5 (55.6)	4 (44.4)	1.062	0.303
No	69	26 (37.7)	43 (62.3)		

Table 2: Dietary habits of students with or without IBS

Dietary habits	Total	IBS n (%)	Non-IBS n (%)	Chi-square	p-value
Vegetables usage					
Twice/week or less	38	18 (47.4)	20 (52.6)	1.232	0.267
3 times/week or more	40	13 (32.5)	27 (67.5)		
Fruits usage					
Twice/week or less	41	18 (43.9)	23 (56.1)	0.312	0.577
3 times/week or more	37	13 (35.1)	24 (64.9)		
Eggs, milk and dairy products					
Twice/week or less	33	12 (36.8)	21 (63.6)	0.273	0.601
3 times/week or more	45	19 (42.2)	26 (57.8)		
Fish usage					
Twice/week or less	73	30 (41.1)	43 (58.9)	0.87	0.351
3 times/week or more	5	1 (20.0)	4 (80.0)		
Nuts usage					
Twice/week or less	65	27 (41.5)	38 (58.5)	0.525	0.469
3 times/week or more	13	4 (30.8)	9 (69.2)		
High-fat diet					
Twice/week or less	53	17 (32.1)	36 (67.9)	4.06	0.044
3 times/week or more	25	14 (56.0)	11 (44.0)		
Fast food diet					
Twice/week or less	49	20 (40.8)	29 (59.2)	0.063	0.801
3 times/week or more	29	11 (37.9)	18 (62.1)		
Homemade diet					
Twice/week or less	28	9 (32.1)	19 (67.9)	1.054	0.305
3 times/week or more	50	22 (44.0)	28 (56.0)		
Coffee					
Twice/week or less	68	27 (39.7)	41 (60.3)	0.000	0.986
3 times/week or more	10	4 (40.0)	6 (60.0)		
Spicy food intake					
Twice/week or less	45	18 (40.0)	27 (60.0)	0.003	0.957
3 times/week or more	33	13 (39.4)	20 (60.6)		
Artificial sweetener					
Twice/week or less	60	21 (35.0)	39 (65.0)	2.443	0.118
3 times/week or more	18	10 (56.6)	8 (44.4)		
Processed food					
Twice/week or less	62	24 (38.7)	38 (61.3)	0.135	0.713
3 times/week or more	16	7 (43.8)	9 (56.3)		

DISCUSSION

This cross-sectional study was conducted among MBBS students at a public-sector medical college in Multan. A prevalence rate of irritable bowel syndrome (IBS) at 39.7% was observed. This aligns with similar studies worldwide indicating high rates of IBS among medical students due to the stressors associated with their rigorous academic curriculum and demanding schedules.[13] In Pakistan, a study conducted among medical students in Karachi reported a prevalence rate of 41% for IBS, further supporting findings of this study.[14] This also suggests that the prevalence of IBS among medical students may be consistent across different regions of Pakistan despite variations in demographics and educational systems. Findings of this study reveal that 43.8% of females and 33.3% of males met the criteria for IBS within the sample group. This difference implies that IBS is more prevalent in females. Several studies have reported similar trends, with a higher prevalence of IBS among females compared to males.[15] Gender differences in gastrointestinal physiology, hormonal fluctuations, psychological issues like anxiety and depression, and sociocultural factors like healthcare-seeking behaviors and social expectations that affect reporting and diagnosis may all contribute to the higher prevalence of IBS in women.[15]

This study found a significant association between IBS and anxiety, depression, as well as physical and academic stress. Medical students suffer higher academic stress which is in line with our findings.[16] Recent research indicates a shared genetic susceptibility between irritable bowel syndrome (IBS) and mood/anxiety disorders, suggesting shared pathophysiological mechanisms rather than causation. Dysregulation of the autonomic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis, exacerbated by stress, impairs gut function and contributes to gastrointestinal symptoms in IBS while also being a key mechanism in depression.

Table 3: HADS and SSI scores of students with or without IBS

Characteristics	Total	IBS n (%)	Non-IBS n (%)	Chi-square/ Fisher's exact	p-value
Anxiety					
Normal	25	4 (16)	21(84)	11.982	0.003
Borderline abnormal	26	10 (38.5)	16 (61.5)		
Abnormal	27	17 (63)	10 (37)		
Depression					
Normal	43	10 (23.3)	33 (76.7)	12.151	0.002
Borderline abnormal	21	11(52.4)	10 (47.6)		
Abnormal	14	10 (71.4)	4 (28.6)		
Physical stress					
Mild	45	10 (22.2)	35 (77.8)	14.205	0.0004
Moderate	32	20 (62.5)	12 (37.5)		
Severe	1	1 (100)	0 (0)		
Interpersonal stress					
Mild	45	17 (37.8)	28 (62.2)	1.599	0.537
Moderate	32	13 (40.6)	19 (59.4)		
Severe	1	1 (100)	0 (0)		
Academic stress					
Mild	27	4 (14.8)	23 (85.2)	10.722	0.005
Moderate	38	20 (52.6)	18 (47.4)		
Severe	13	7 (53.8)	6 (46.2)		
Environmental stress					
Mild	21	5 (23.8)	16 (76.2)	3.051	0.217
Moderate	37	17 (45.9)	20 (54.1)		
Severe	20	9 (45)	11 (55)		

Table 4: PSQI and CTQ subscales in students with or without IBS

Characteristics	Total	IBS n (%)	Non-IBS n (%)	Chi-square/ Fisher's exact	p-value
PSQI scale					
Good sleep	14	1 (7.1)	13 (92.9)	6.004	0.014
Poor sleep	64	30 (46.9)	34 (53.1)		
Emotional abuse					
None	64	22 (34.4)	42 (65.6)	7.100	0.053
Low	8	5 (62.5)	3 (37.5)		
Moderate	3	1 (33.)	2 (66.7)		
Severe	3	3 (100)	0 (0)		
Physical abuse					
None	63	21 (33.3)	42 (66.7)	9.101	0.016
Low	6	3 (50)	3 (50)		
Moderate	4	2 (50)	2 (50)		
Severe	5	5 (100)	0 (0)		
Sexual abuse					
None	54	21 (38.9)	33 (61.1)	4.040	0.257
Low	12	3 (25)	9 (75)		
Moderate	5	2 (40)	3 (60)		
Severe	7	5 (71.4)	2 (28.6)		
Physical neglect					
None	43	18 (41.9)	25 (58.1)	1.591	0.661
Low	10	4 (40)	6 (60)		
Moderate	10	5 (50)	5 (50)		
Severe	15	4 (26.7)	11 (73.3)		
Emotional neglect					
None	35	15 (42.9)	20 (57.1)	9.975	0.019
Low	11	5 (45.5)	6 (54.5)		
Moderate	14	9 (64.3)	5 (35.7)		
Severe	18	2 (11.1)	16 (88.9)		

Table 5: Multivariate logistic regression analysis for assessing associated factors for IBS

Characteristics	β	Standard error	Wald	Odds ratio	95% CI		p-value
					Lower	Upper	
PSQI	3.369	1.565	4.634	29.041	1.352	623.726	0.031
Past history of IBS	4.616	1.549	8.881	101.095	4.856	2104.799	0.003
Effect on grades	2.909	1.124	6.697	18.331	2.025	165.904	0.010

The gut microbiome, influencing gut-brain communication, differs in composition between individuals with and without depression and IBS, suggesting its role in the pathophysiology.[17] These results support existing literature demonstrating a strong link between IBS and psychological factors.[15] This bidirectional relationship between stress and IBS has been well-documented, with stress exacerbating IBS symptoms and IBS leading to increased psychological distress. A significant association between poor sleep quality (PSQI) and IBS was observed in this study. According to a meta-analysis, poor sleep quality increases the risk of developing IBS.[18] The link between sleep disorders and irritable bowel syndrome (IBS) involves altered autonomic nervous system activity, increased cortisol secretion, and changes in gut microbiota. Sleep disruption may exacerbate IBS symptoms like abdominal pain, while gut microbes and their metabolites influence sleep quality and immune responses. This bidirectional interaction suggests that disturbances in the gut-brain-microbiota axis play a role in the association between sleep disorders and IBS, although further research is needed to clarify specific mechanisms.[19] Childhood trauma, such as physical or sexual abuse, has the potential to induce psychological distress, thereby amplifying stress responses and resulting in symptoms similar to those observed in IBS.[20] The significant association between physical abuse and emotional neglect in childhood (CTQ subscales) and IBS found in the present study corroborates previous literature suggesting a link between childhood trauma and the development of IBS later in life.[21] The multivariate logistic regression analysis in this study identified poor sleep quality, past history of IBS, and academic performance as significant associated factors for IBS. A study from Saudi Arabia found significant relation between poor academic performance and IBS.[22] As IBS is a chronic disease and it has periods of remission as well, so it has significant association with past history of IBS.[1] This study explores the prevalence and risk factors of irritable bowel syndrome in young adults. However, it has limitations such as a cross-sectional design, relatively small sample size and reliance on self-report measures. Additionally, the study did not assess potential confounding variables like recent adverse events, and medication use, and was restricted to medical students which might influence the generalizability of the results. Despite these limitations, the study contributes valuable information to existing literature on IBS. Further longitudinal, large multicenter studies are needed to better understand these factors.

CONCLUSION

This study found a substantial prevalence of IBS among medical students, with mixed bowel habits being the predominant subtype. The study also identified significant associations between IBS and psychological factors like anxiety, depression, stress, poor sleep quality, and childhood trauma.

Author Contributions

GMN: Conceptualization, Supervision, Formal analysis, Data curation, Writing – review & editing, and final approval of the manuscript. SI: Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing, and proofreading. WA: Formal analysis, Writing – original draft, Writing – review & editing, and proofreading. MZ: Data curation, Formal analysis, and Interpretation of data. AZ: Data curation, Formal analysis, and Interpretation of data. All authors approved the final version.

AI Disclosure

ChatGPT (OpenAI) was used during the preparation of this manuscript for language editing, including grammar, spelling, and readability; improving the clarity and structure of the manuscript; and summarizing or paraphrasing text originally written by the authors. The authors reviewed and revised all AI-assisted content, verified its accuracy, and take full responsibility for the final content of the manuscript.

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