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Original Article

Prevalence and Factors Associated with IBS among Medical Students and Junior Doctors

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ABSTRACT

Background: *Irritable bowel syndrome (IBS) is a common functional gastrointestinal disorder influenced by stress, lifestyle, and psychosocial factors. Medical students and junior doctors may be particularly susceptible due to academic and clinical pressures. The current study aimed to determine the prevalence of IBS and its associated risk factors among medical students and junior doctors in Bangladesh using Rome IV criteria.* ***Methods & Materials:*** *A cross-sectional analytical study was conducted from January 2022 to January 2024 among 600 participants (300 medical students, 300 junior doctors). Data were collected using a structured, self-administered questionnaire incorporating Rome IV diagnostic items, BMI, perceived stress, and sleep quality. Cox proportional hazards models were used to identify predictors.* ***Results:*** *Overall IBS prevalence was 37.5%. Medical students had significantly higher IBS prevalence (41.7%) than junior doctors (33.3%). Female gender (HR = 1.32, p = 0.008), overweight/obese BMI (HR = 1.34, p = 0.009), high stress (HR = 1.71, p < 0.001), and sleep disturbance (HR = 1.50, p = 0.002) were independent risk factors. Age and occupation were not significant after adjustment.* ***Conclusion:*** *IBS is highly prevalent among medical trainees in Bangladesh, with modifiable lifestyle and psychosocial factors being key contributors. Targeted interventions to address stress and sleep quality may reduce disease burden in this population.*

Keywords: *Irritable Bowel Syndrome, Medical Students, Junior Doctors, Stress, Sleep Disturbance, BMI, Rome IV Criteria*

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INTRODUCTION

Irritable Bowel Syndrome (IBS) is a common chronic functional gastrointestinal disorder characterized by recurrent abdominal pain associated with altered bowel habits in the absence of identifiable structural or biochemical abnormalities. Under the Rome IV criteria, IBS is classified into four subtypes based on stool consistency: IBS with predominant diarrhea (IBS-D), constipation (IBS-C), mixed pattern (IBS-M), and unclassified (IBS-U). Rome IV places greater diagnostic emphasis on abdominal pain than its predecessor, Rome III, and thereby identifies a smaller but more clinically significant population [1,2]. The update has also highlighted the complex interaction of the gut–brain axis in symptom development, where visceral hypersensitivity, dysmotility, and central pain dysregulation play significant roles [3,4]. Globally, the prevalence of IBS varies widely due to differences in diagnostic criteria, geography, and sociocultural context. A large systematic review by Oka et al. showed that the pooled global prevalence of IBS was 9.2% under Rome III but declined to 3.8% under Rome IV, reflecting the stricter diagnostic approach [5]. Regional heterogeneity is notable, with Asian prevalence estimates ranging from 1% to 21%, averaging approximately 12%. Importantly, studies suggest that cultural factors, symptom reporting norms, diet, and healthcare-seeking behavior all influence the reported prevalence in Asian countries [6]. In Bangladesh, existing evidence is sparse and mostly based on Rome III criteria. For instance, a study by Ghosh et al. among university students reported an IBS prevalence of 7.2%, with IBS-M and IBS-D as the most common subtypes [7]. Similarly, Perveen et al. reported a 7.7% prevalence in urban adults using Rome II criteria [8]. These findings suggest that IBS may be underdiagnosed or misclassified in Bangladesh under previous diagnostic frameworks. Emerging literature has consistently shown that medical students and junior doctors experience a disproportionately higher burden of IBS compared to the general population, driven by intense academic stress, irregular sleep patterns, poor dietary habits, and limited physical activity [9]. Several international studies reinforce this trend. For example, a study in Saudi Arabia reported a prevalence of 29.3% among medical students, identifying predictors such as inadequate sleep, smoking, and carbonated drinks [10]. Similarly, Fraij et al. found a prevalence of 17.3% in UAE medical students, with stress and anxiety as key predictors [11]. Importantly, Rome IV-based studies reveal lower prevalence but stronger associations with psychological comorbidities, reinforcing the role of the gut–brain axis and stress-induced pathophysiology [1,12]. The disease burden of IBS extends beyond gastrointestinal symptoms. It significantly impairs quality of life, increases healthcare utilization, and

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leads to productivity loss, particularly in low- and middle-income countries (LMICs) where awareness and access to care remain limited [13]. In Bangladesh, Sarker et al. reported significant associations between IBS and low income, anxiety, and psychological stress [14]. Patients often report higher willingness to take health risks for symptom relief, highlighting the intensity of suffering associated with the condition [15]. Such data underscore the need for targeted research in high-risk groups, especially in academic healthcare settings where stress levels are consistently elevated. The pathophysiology of IBS involves a complex interplay between psychological stress, gut dysbiosis, immune modulation, and visceral hypersensitivity. Chronic academic and emotional stress disrupts the gut–brain axis through both central and peripheral mechanisms, leading to dysregulation of motility and increased pain sensitivity [3,4]. Animal studies confirm that stress alters gene expression in brain regions like the amygdala and hippocampus, increases colonic permeability, and induces persistent visceral hypersensitivity—factors directly translatable to the human IBS experience [16,17]. These findings support the inclusion of stress, sleep quality, and lifestyle factors as potential predictors in IBS research. Despite international progress, no published study from Bangladesh has yet addressed IBS among medical trainees using the Rome IV criteria, nor has any comprehensively modeled biopsychosocial predictors through multivariate analysis. Previous studies have used outdated diagnostic frameworks (e.g., Rome III or II), involved mixed student populations, or failed to analyze modifiable lifestyle and psychological variables in a single model. Thus, a major gap remains in understanding the true burden and risk profile of IBS in Bangladesh's medical academic community.

METHODS & MATERIALS

This was a cross-sectional analytical study conducted between January 2022 and January 2024 to determine the prevalence of irritable bowel syndrome (IBS) and its associated factors among medical students and junior doctors. A total of 600 participants were enrolled, comprising 300 medical students and 300 junior doctors, selected using stratified sampling from medical colleges and affiliated teaching hospitals. After obtaining informed consent, participants were asked to complete a structured, self-administered questionnaire based on the Rome IV criteria (give reference) for the diagnosis of IBS. The questionnaire also included sections on demographic characteristics, stress levels, sleep disturbance, and body mass index (BMI). Participants who were free of IBS at baseline were later re-assessed for the development of IBS symptoms, allowing for the identification of newly diagnosed and recurring cases over the study period. Although the study design was primarily cross-sectional, data collection included follow-up assessments of the same individuals to better characterize symptom progression and risk factors. Statistical analysis involved descriptive statistics, logistic regression to identify factors associated with IBS, and Cox proportional hazards modeling to assess time-related risk estimates for IBS development in relation to various demographic and clinical variables.

IBS Subtypes (Based on Stool Consistency) [18]:

IBS Subtype	Stool Consistency (≥25% of bowel movements)
IBS-C	Hard or lumpy stools (types 1–2)
IBS-D	Loose or watery stools (types 6–7)
IBS-M	Mixed bowel habits (both types 1–2 and 6–7)
IBS-U	Unclassified (inconsistent stool form)

RESULTS

A total of 600 participants were included in the study, evenly split between medical students (n = 300, 50.0%) and junior doctors (n = 300, 50.0%). The majority of participants were aged between 18 and 24 years (55.0%), while 45.0% were between 25 and 30 years. Female participants comprised a slight majority (n = 320, 53.3%) compared to males (n = 280, 46.7%). Regarding body mass index (BMI), 65.0% of participants had a normal BMI, while 11.7% were underweight, 16.7% were overweight, and 6.6% were classified as obese. [Table-I]

Table – I: Demographic Characteristics of Participants (Baseline + Follow-up Data, *n*=600)

Category	Frequency	Percentage (%)
Age		
18–24	330	55.0%
25–30	270	45.0%
Gender		
Male	280	46.7%
Female	320	53.3%
Occupation		
Medical Students	300	50.0%
Junior Doctors	300	50.0%
BMI Categories		
Underweight	70	11.7%
Normal Weight	390	65.0%
Overweight	100	16.7%
Obese	40	6.6%

Among the 600 participants, the overall prevalence of IBS—combining newly diagnosed and follow-up cases—was 37.5% (n = 225). IBS was more prevalent among medical students (41.7%) compared to junior doctors (33.3%). Specifically, 75 new cases and 50 follow-up cases were recorded among students, while 60 new cases and 40 follow-up cases were reported among junior doctors. [Table-II]

Table – II: Prevalence of IBS among Participants (Baseline + Follow-up Data, *n*=600)

Group	Newly Diagnosed IBS	Follow-up IBS Cases	Total IBS Cases	Prevalence (%)
Medical Students (n=300)	75	50	125	41.7%
Junior Doctors (n=300)	60	40	100	33.3%
Total (n=600)	135	90	225	37.5%

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IBS was more prevalent among female participants compared to males. Of the 320 females, 135 were diagnosed with IBS (42.2%), including 85 new cases and 50 follow-up cases. In contrast, 90 out of 280 males (32.1%) had IBS, with 50 newly diagnosed and 40 follow-up cases. [Table-III]

Table – III: IBS Prevalence by Gender (Baseline + Follow-up Data, *n*=600)

Gender	Newly Diagnosed IBS	Follow-up IBS Cases	Total IBS Cases	Prevalence (%)
Male (n=280)	50	40	90	32.1%
Female (n=320)	85	50	135	42.2%

IBS prevalence varied across BMI categories. The highest prevalence was observed among overweight participants at 43.0% (n = 43), followed by obese and underweight individuals, both at 40.0% (n = 16 and n = 28, respectively). Among those with normal BMI, the prevalence was slightly lower at 35.4% (n = 138). These findings suggest a potential U-shaped relationship between BMI and IBS occurrence. [Table-IV]

Table – IV: IBS Prevalence by BMI Category (Baseline + Follow-up Data, *n*=600)

BMI Category	Newly Diagnosed IBS	Follow-up IBS Cases	Total IBS Cases	Prevalence (%)
Underweight (n=70)	18	10	28	40.0%
Normal Weight (n=390)	78	60	138	35.4%
Overweight (n=100)	28	15	43	43.0%
Obese (n=40)	11	5	16	40.0%

After adjusting for age, BMI, stress levels, and sleep disturbance, medical students were found to have a significantly higher risk of developing IBS compared to junior doctors. The hazard ratio was 1.32 (95% CI: 1.05–1.66, p = 0.021), indicating that medical students had a 32% higher hazard of IBS onset during the study period. [Table-V]

Table – V: Comparison of IBS Risk by Group (Cox Proportional Hazards Model) (Adjusted for age, BMI, stress, and sleep disturbance)

Group	Reference Group	Hazard Ratio (HR)	95% CI	p-value
Medical Students	Junior Doctors	1.32	1.05–1.66	0.021

Multivariable Cox regression analysis revealed several significant predictors of new IBS diagnoses. Participants with high stress levels had the strongest association with IBS, showing a 77% higher hazard (HR = 1.77; 95% CI: 1.30–2.43; p < 0.001). Sleep disturbance was also significantly associated, increasing IBS risk by 56% (HR = 1.56; 95% CI: 1.14–2.14; p = 0.006). Female gender was a significant risk factor (HR = 1.38; 95% CI: 1.05–1.81; p = 0.021), as was being overweight or obese compared to normal BMI (HR = 1.30; 95% CI: 1.05–1.72; p = 0.022). Age group, underweight status, and occupation were not statistically significant predictors. [Table-VI]

Table – VI: Cox Regression Analysis – Baseline IBS Risk Factors (Adjusted for age, BMI, stress, and sleep disturbance)

Factor	Category / Reference	Hazard Ratio (HR)	95% CI	p-value
Gender	Female vs. Male	1.38	1.05–1.81	0.021
Age Group	25–30 vs. 18–24	0.95	0.70–1.28	0.692
Occupation	Junior Doctor vs. Student	0.85	0.61–1.20	0.353
BMI Category	Overweight/Obese vs. Normal	1.30	1.05–1.72	0.022
	Underweight vs. Normal	1.19	0.83–1.71	0.347
Stress Level	High vs. Low	1.77	1.30–2.43	<0.001
Sleep Disturbance	Yes vs. No	1.56	1.14–2.14	0.006

In the follow-up phase, high stress levels continued to show a strong and statistically significant association with IBS, increasing the hazard by 65% (HR = 1.65; 95% CI: 1.22–2.22; p = 0.001). Overweight or obese individuals also demonstrated a significantly higher risk (HR = 1.40; 95% CI: 1.10–1.79; p = 0.006), and sleep disturbance remained a significant predictor (HR = 1.43; 95% CI: 1.07–1.91; p = 0.015). Gender approached significance (p = 0.078), while age group, underweight status, and occupation were not significantly associated with IBS development during follow-up. [Table-VII]

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Table – VII: Cox Regression Analysis – Follow-up IBS Risk Factors (Adjusted for age, BMI, stress, and sleep disturbance)

Factor	Category / Reference	Hazard Ratio (HR)	95% CI	p-value
Gender	Female vs. Male	1.25	0.98–1.61	0.078
Age Group	25–30 vs. 18–24	1.05	0.80–1.37	0.723
Occupation	Junior Doctor vs. Student	0.90	0.69–1.18	0.442
BMI Category	Overweight/Obese vs. Normal	1.40	1.10–1.79	0.006
	Underweight vs. Normal	1.05	0.74–1.50	0.791
Stress Level	High vs. Low	1.65	1.22–2.22	0.001
Sleep Disturbance	Yes vs. No	1.43	1.07–1.91	0.015

In the combined Cox regression model including all patients, several factors remained statistically significant predictors of IBS. Female participants had a 32% higher hazard of developing IBS compared to males (HR = 1.32; 95% CI: 1.08–1.62; p = 0.008). Being overweight or obese was also significantly associated with increased risk (HR = 1.34; 95% CI: 1.08–1.66; p = 0.009). High stress levels showed the strongest association, with a 71% higher hazard of IBS (HR = 1.71; 95% CI: 1.32–2.21; p < 0.001), while sleep disturbance was also an independent risk factor (HR = 1.50; 95% CI: 1.17–1.92; p = 0.002). Age group, occupation, and underweight status were not significantly associated with IBS in the adjusted model. These findings highlight that female gender, high stress levels, overweight/obesity, and sleep disturbance are consistent and robust predictors of IBS across both baseline and follow-up phases. [Table-VIII]

Table – VIII: Combined Model – Cox Regression Analysis for All Patients (Baseline + Follow-up) (Adjusted for age, BMI, stress, and sleep disturbance)

Factor	Category / Reference	Hazard Ratio (HR)	95% CI	p-value
Gender	Female vs. Male	1.32	1.08–1.62	0.008
Age Group	25–30 vs. 18–24	0.99	0.78–1.28	0.948
Occupation	Junior Doctor vs. Student	0.87	0.71–1.07	0.175
BMI Category	Overweight/Obese vs. Normal	1.34	1.08–1.66	0.009
	Underweight vs. Normal	1.12	0.86–1.46	0.392
Stress Level	High vs. Low	1.71	1.32–2.21	<0.001
Sleep Disturbance	Yes vs. No	1.50	1.17–1.92	0.002

DISCUSSION

The present study provides an updated estimate of the burden of Irritable Bowel Syndrome (IBS) and its associated risk factors among medical students and junior doctors in Bangladesh, employing the standardized Rome IV criteria. With a combined prevalence of 37.5%, the results position IBS as a notably common disorder within this high-stress academic and clinical population. Our prevalence is substantially higher than that reported by Mohammed et al. in Saudi Arabia (17.2%) and by Mansour-Ghanaei et al. in Iran (12.6%), though closely aligned with recent findings from UAE and South Asia that emphasize a rising burden among younger cohorts [19,20]. The use of Rome IV criteria, known to yield lower prevalence estimates than its predecessor (Rome III), suggests that our findings reflect a genuinely elevated disease burden rather than over diagnosis [21]. One of the most striking observations in our study was the significantly higher prevalence of IBS among medical students (41.7%) compared to junior doctors (33.3%), with medical students facing a 32% increased hazard even after adjusting for key confounders. This differential risk is consistent with studies conducted by Anthea et al. in Malta and Goyal et al. in India, both of which documented elevated IBS prevalence among medical students, attributing it to academic overload, lack of sleep, and lifestyle instability [22,23]. Though one might anticipate that working physicians endure greater stress, our findings, supported by Gamarra et al., suggest that students' anticipatory anxiety and erratic routines may be more detrimental in the context of gut–brain axis disruption [24]. Sex-based disparities in IBS risk were also evident, with female participants showing a significantly higher prevalence (42.2% vs. 32.1%) and retaining significance in adjusted models. Similar findings were observed in several large cohorts, including studies by Wang et al. and Sargin and Ceylan, which attribute female predominance to heightened visceral sensitivity and hormonal influences that exacerbate IBS symptomatology [25,26]. Our findings reinforce the robustness of gender as a non-modifiable but important demographic risk marker, particularly within young adult clinical populations. In terms of anthropometric correlates, our data revealed a notable U-shaped pattern of IBS prevalence across BMI categories, with overweight individuals exhibiting the highest prevalence (43.0%), while both obese and underweight groups shared a prevalence of 40.0%. Overweight/obesity remained an independent predictor of IBS in multivariable models (HR = 1.34, p = 0.009), consistent with findings by Yamamoto et al. and Dong et al., who reported higher IBS prevalence and symptom severity in individuals with elevated BMI [27,28]. Importantly, underweight status was not significantly associated with IBS in our cohort (p = 0.392), a finding corroborated by systematic reviews that highlight the limited predictive value of low BMI in IBS pathophysiology [21,27]. The most compelling predictors of IBS in this study were psychosocial. High perceived stress emerged as the strongest and most consistent risk factor across all models, with hazard ratios ranging from 1.65 to 1.77. This is in concordance with global studies among medical students, including those by Fraij et al. and Fadl et al., which demonstrated that elevated stress scores significantly increase IBS risk [11,29]. The gut–

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brain axis has long been implicated in IBS, and our findings reiterate its centrality in younger clinical populations. Likewise, sleep disturbance was independently associated with higher IBS risk (HR = 1.50, p = 0.002), echoing the results of Maghsoudi et al. (2021), who found that poor sleep quality significantly increased the likelihood of Rome IV-diagnosed IBS [30]. These results underscore the interplay between stress, sleep, and GI symptoms, supporting a multidimensional biopsychosocial framework. Interestingly, neither age group (25–30 vs. 18–24 years) nor occupational role (junior doctor vs. medical student) retained statistical significance in adjusted models, suggesting that IBS susceptibility in this cohort is less about professional seniority and more about individual psychosocial load and lifestyle variability. This finding aligns with the observations of Cañón et al. and Fraij et al., both of whom reported minimal age-related differences in IBS prevalence among young adult university-affiliated samples [11,31]. Finally, the lack of association between underweight BMI and IBS in our study further supports the view that BMI-related risk is more strongly linked to excess adiposity rather than malnutrition, a conclusion also reflected in recent meta-analyses [21,28]. Taken together, the results reinforce the need for targeted interventions addressing stress management and sleep hygiene, especially among medical students, while also highlighting the value of stratified lifestyle and psychosocial screening in predicting and preventing IBS onset in similar clinical-educational settings.

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

This study highlights a notably high burden of irritable bowel syndrome (IBS) among medical students and junior doctors in Bangladesh, with an overall prevalence of 37.5% using the Rome IV diagnostic criteria. Medical students were found to be at significantly higher risk compared to junior doctors, with stress, sleep disturbance, female gender, and elevated BMI emerging as independent predictors of IBS. Among these, high perceived stress was the strongest risk factor across all analyses. While being overweight or obese significantly increased IBS risk, underweight status did not. Notably, neither age nor occupational status retained statistical significance after adjustment, suggesting that individual psychosocial and lifestyle factors play a more critical role in IBS development than demographic characteristics alone. These findings underscore the urgent need for integrated stress management, sleep hygiene promotion, and lifestyle interventions within medical academic environments. Early identification and targeted support for high-risk individuals, especially female medical students with high stress levels and poor sleep, may help mitigate the rising burden of IBS in this vulnerable population.

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