

The prevalence of irritable bowel syndrome and its association with academic performance among medical students at Taibah University

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Abstract

Objective: To determine the prevalence of irritable bowel syndrome among medical students, and to investigate its association with academic performance indicators.

Method: The cross-sectional study was conducted at Taibah University, Madinah, Saudi Arabia, from February to October 2023, and comprised second- to sixth-year medical students aged at least 18 years. Data was collected using a self-administered online questionnaire that explored sociodemographic information, medical history, exercise history and irritable bowel syndrome symptoms as per the Rome IV criteria. The association of irritable bowel syndrome was assessed with academic achievement, extracurricular activities, lecture attendance, and attention during lectures. Data was analysed using SPSS 26.

Results: Of the 1,020 students, 291(28.5%) completed the survey. Among them, 180(61.9%) were women, 69(23.7%) were in the third academic year and 260(89.3%) were non-smokers. Overall, 29(10%) subjects reported symptoms consistent with irritable bowel syndrome. Irritable bowel syndrome negatively affected extracurricular activities, lecture attendance, attention during lectures and study hours ($p < 0.05$), but the total grade point average was not affected significantly ($p > 0.05$).

Conclusion: Irritable bowel syndrome had a significant impact on academic performance, showing associations with decreased attention during lectures, increased absences, and fewer hours spent studying.

Keywords: Irritable bowel syndrome, Prevalence, Academic success, Students, Medical. (JPMA 76: 1867; 2026)

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Introduction

Irritable bowel syndrome (IBS) is one of the most common gastrointestinal disorders,¹ but its pathophysiology is still not fully understood. Inflammation and immunological factors are thought to be the primary underlying causes of IBS although several others exist.² IBS is characterised by abdominal pain or discomfort that influences bowel habits without affecting the anatomy or histology of the intestine,³ and it is diagnosed based on a comprehensive clinical assessment. According to the Rome IV criteria, IBS is characterised by recurrent abdominal pain that has occurred at least once a week on average over the preceding three months along with at least two of the following symptoms: changes in stool appearance, increased bowel movement frequency, and pain that is relieved by defecation. Symptoms must have started at least six months before the assessment, and abdominal pain must have been present for at least three months to meet the criteria for an IBS diagnosis.¹

IBS can significantly impact an individual's quality of life. Interestingly, IBS is more common among medical students than the general population.⁴ Medical students are likely to develop IBS due to numerous stressors, including emotional, psychological and lifestyle factors.³ The occurrence of IBS in medical students across the world is inconsistent, with a prevalence of 9.3% to 35.3% reported from different geographical regions by research based on different methodologies and many other variables.⁵ The authors of studies in Saudi Arabia have reported higher prevalence of IBS in medical students than in students of other specialties, such as 44.5% at King Faisal University³ and 29.28% at Al Jouf University.⁶ In contrast, the IBS prevalence was 21% at King Saud University in Riyadh,² 15.6% at King Saud University in Jeddah,⁷ and 31% at Ain Shams University in Egypt.⁸

A 2016 study of medical students at Taibah University showed that the factors contributing to the high prevalence of IBS included low socioeconomic status (SES), graduation year and a low grade point average (GPA), but the study did not assess the effects of IBS on academic performance.⁹ The current study was planned to determine the prevalence of IBS among medical students, and its effects on their academic performance.

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Subjects and Methods

The retrospective analytical cross-sectional study was conducted at Taibah University, Madinah, Saudi Arabia, from February to October 2023. After approval from the institutional ethics review committee, the study was conducted according to the Declaration of Helsinki.¹⁰ The sample size was calculated using the formula $n_0 = (Z^2 \times P(1-P))/d^2$ in which n_0 was the initial required sample size, Z was the standard normal deviate corresponding to the confidence level, P was the expected prevalence, and d was the margin of error. The confidence level was kept at 95% for the real value to be within $\pm 5\%$ of the measured/surveyed value.¹¹ The sample was raised using non-probability, convenience, snowball sampling method. The total number of medical students was obtained from the University Registration Unit. Those included were second- to sixth-year medical students aged 18 years or older who provided informed consent. Those excluded were students with a known organic gastrointestinal disease, such as inflammatory bowel disease or coeliac disease.

A self-administered online questionnaire that was prepared in English and Arabic using Google Forms was distributed among medical students at Taibah University via social media.

The questionnaire included three sections with closed-ended questions. The first section sought informed consent and collected demographic characteristics (gender, academic year and smoking status). The second section included questions about each student's medical history (history of any medical diseases, personal history of IBS, family history of IBS, history of allergies, and history of laxative use for constipation), history of recent stressful life events, exercise history (frequency and intensity), and body mass index (BMI). Questions relating to the Rome IV diagnostic criteria of IBS¹ were also included in this section, and the students were asked whether they had experienced three months of recurrent abdominal pain that was associated with two or more of the following symptoms: a change in stool appearance, an increase in the frequency of bowel movements, or abdominal pain that improved with defecation. The third section pertained to the association between IBS and academic achievement on the basis of each student's GPA before and after the appearance of IBS symptoms, extracurricular activities, absences from lectures, and attention span during lectures.

Data was analysed using SPSS 26. Categorical variables were presented as the absolute frequencies and valid percentages, and participants with missing data for one variable were excluded from the calculation of the valid

percentage. Chi-square tests were used for association analyses where the expected cell count was at least 5 in all cells, while Fisher's exact test was used in case of < 5 cell count in $\geq 20\%$ of the cells. $P < 0.05$ was considered statistically significant, $p < 0.10$ indicated a trend towards association.

Results

Of the 1,020 students, 291 (28.5%) completed the survey. Among them, 180 (61.9%) were women, 69 (23.7%) were in the third academic year and 260 (89.3%) were non-smokers. Moreover, 182 (62.5%) participants (had a BMI of 18–24.9 kg/m², 232 (79.7%) exercised for less than 150 minutes per week, and, of the 285 participants who provided information on the intensity of aerobic exercise, 173 (60.7%) practised mild-intensity exercises (Table 1).

Of the total, 261 (89.7%) subjects had experienced recent stressful events in their lives, 237 (81.4%) did not have food allergies, 229 (78.7%) did not use laxatives for constipation, and 143 (49.1%) had a family history of IBS. Of the 68 (23.4%) participants who provided information regarding other diseases, 33 (48.5%) had been diagnosed with another disease. Of the 54 (18.6%) participants with food allergies, 15 (27.8%) had a dairy allergy and 13 (24.1%) had a seafood allergy (Table 2).

Table 1: Demographic characteristics of the participants (n=291).

Parameter	n (%)
Gender	
Female	180 (61.9)
Male	111 (38.1)
Academic year	
Second	67 (23)
Third	69 (23.7)
Fourth	55 (18.9)
Fifth	60 (20.6)
Sixth	40 (13.7)
Smoking status	
Smoker/ex-smoker	31 (10.7)
Non-smoker	260 (89.3)
Body mass index in kg/m²	
< 18	32 (11)
18–24.9	182 (62.5)
25–29.9	52 (17.9)
30–40	16 (5.5)
> 40	9 (3.1)
Number of minutes of exercise per week	
> 150	59 (20.3)
< 150	232 (79.7)
Intensity of aerobic exercise (n=285)	
Low (slow walking)	173 (60.7)
Moderate (brisk walking)	72 (25.3)
High (running)	16 (5.6)
Other	24 (8.4)

Based on the responses to questions related to the Rome IV criteria, 132(45.4%) had experienced recurrent abdominal pain in the preceding three months. Furthermore, 109(37.5%) subjects reported at least two IBS-related symptoms (Table 3) in association with abdominal pain in the preceding three months (Table 3). Overall, 29(10%) subjects met the Rome IV IBS criteria for IBS (Figure 1).

Of the 109(37.5%) participants who had experienced at least two of the symptoms associated with abdominal pain, 79(72.5%) did not stop attending lectures, 76(69.7%) did not stop participating in classroom activities or

Table-2: Medical history of the participants.

Parameter	n (%)
Family history of irritable bowel syndrome	
Yes	143 (49.1)
No	148 (50.9)
Experience of recent stressful events	
Yes	261 (89.7)
No	30 (10.3)
Presence of food allergies	
Yes	54 (18.6)
No	237 (81.4)
Types of food that cause allergies	
Dairy products	15 (27.8)
Seafood	13 (24.1)
Vegetables	8 (14.8)
Fruits	6 (11.1)
Eggs	5 (9.3)
Legumes	4 (7.4)
Nuts	4 (7.4)
Other	4 (7.4)
Grains	3 (5.6)
Caffeine	1 (1.9)
Chocolate	1 (1.9)
Use of laxatives for constipation	
Yes	62 (21.3)
No	229 (78.7)
Diagnosis of other diseases (n = 68)	
Yes	33 (48.5)
No	35 (51.5)

Table-3: Prevalence of Rome IV functional bowel disorder symptoms among the participants.

Parameters	n (%)
Experienced recurrent abdominal pain in the past 3 months	
Yes	132 (45.4)
No	159 (54.6)
Experienced at least two of the following symptoms associated with abdominal pain in the past 3 months:	
o Abdominal pain that improves after defecation	
o Change in stool appearance	
o Increase in the frequency of bowel movements	
Yes	109 (37.5)
No	182 (62.5)

extracurricular activities, and 46(42.2%) had a GPA ranging between 4.75 and 5 (Table 4).

IBS prevalence was found significantly associated with gender, family history of IBS and food allergies, while no significant association was found with smoking status, BMI, exercise duration per week, intensity of aerobic exercise, recent experience of stressful events and the diagnosis of other diseases (Table 5, Figure 2).

IBS negatively affected extracurricular activities, lecture attendance, attention during lectures and study hours, but the total GPA was not affected significantly (Table 6).

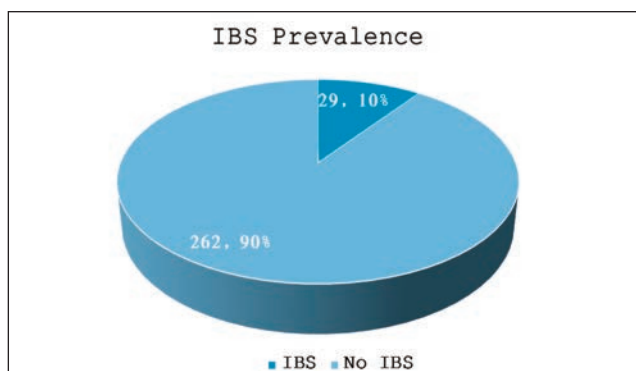


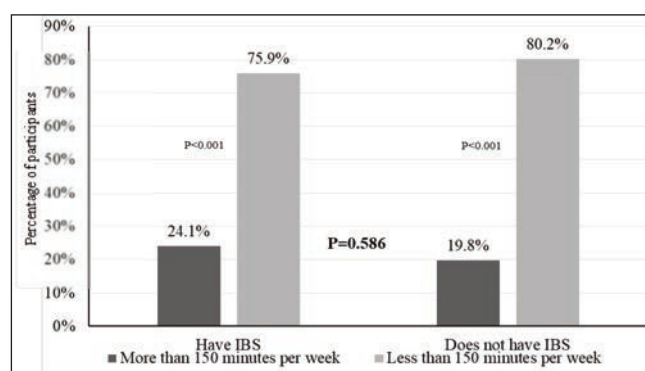
Figure-1: Prevalence of irritable bowel syndrome (IBS) among the participants (n=291).

Table-4: Academic performance of the participants who reported the onset of recurrent abdominal pain (n=109).

Parameters	n (%)
Decreased attention during lectures after the onset of recurrent abdominal pain	
Yes	62 (56.9)
No	47 (43.1)
Increased absence from lectures after the onset of recurrent abdominal pain	
Yes	30 (27.5)
No	79 (72.5)
Stopped or decreased participation in the classroom or extracurricular activities after the onset of recurrent abdominal pain	
Yes	33 (30.3)
No	76 (69.7)
Experienced a decrease in studying hours after the onset of recurrent abdominal pain	
Yes	50 (45.9)
No	59 (54.1)
Grade point average before the onset of recurrent abdominal pain	
5-4.75	71 (65.1)
4.74-4.5	24 (22)
4.4-4.0	11 (10.1)
< 4.0	3 (2.8)
Grade point average after the onset of recurrent abdominal pain	
5-4.75	46 (42.2)
4.74-4.5	32 (29.4)
4.4-4.0	24 (22)
< 4.0	7 (6.4)

Table-5: Association of irritable bowel syndrome (IBS) prevalence with sociodemographic characteristics (n=291).

Factors	Prevalence of IBS, n (%)		χ^2	p value
	With IBS	Without IBS		
Gender				
Male	5 (4.5)	106 (95.5)	5.965	0.015*
Female	24 (13.3)	156 (86.7)		
Academic year				
Junior	23 (9.2)	228 (90.8)	1.310	0.252
Senior	6 (15)	34 (85)		
Smoking status				
Smoker/Ex-smoker	3 (9.7)	28 (90.3)	0.955	1.000
Non-smoker	26 (10)	234 (90)		
Body mass index				
Underweight	4 (12.5)	28 (87.5)	0.510	0.513
Normal weight	15 (8.2)	167 (91.8)		
Overweight	7 (13.5)	45 (86.5)		
Obese	3 (12)	22 (88)		
Number of minutes per week of exercise				
> 150	7 (11.9)	52 (88.1)	0.297	0.586
< 150	22 (9.5)	210 (90.5)		
Intensity of aerobic exercise				
Low (slow walking)	12 (6.9)	161 (93.1)	5.802	0.089**
Moderate (brisk walking)	11 (15.3)	61 (84.7)		
Severe (running)	2 (12.5)	14 (87.5)		
Other	4 (16.7)	20 (83.3)		
Family history of IBS				
Yes	24 (16.8)	119 (83.2)	14.565	0.001*
No	5 (3.4)	143 (96.6)		
Experience of recent stressful events				
Yes	28 (10.7)	233 (89.3)	0.200	0.333
No	1 (3.3)	29 (96.7)		
Allergies to certain foods				
Yes	10 (18.5)	44 (81.5)	5.406	0.020*
No	19 (8)	218 (92)		
Diagnosis of other diseases				
Yes	0 (0)	33 (100)	0.085	0.239
No	3 (8.6)	32 (91.4)		

**Figure-2:** Association between exercise duration per week and irritable bowel syndrome (IBS) prevalence.**Table-6:** Relationship of irritable bowel syndrome (IBS) and academic performance of participants who reported the onset of recurrent abdominal pain (n=109).

Variables	Prevalence of IBS, n (%)		χ^2	p value
	With IBS	Without IBS		
Decreased attention during lectures after the onset of recurrent abdominal pain				
Yes	17 (81)	45 (51.1)	6.145	0.013*
No	4 (19)	43 (48.9)		
Increased absence from lectures after the onset of recurrent abdominal pain				
Yes	11 (52.4)	19 (21.6)	8.058	0.005*
No	10 (47.6)	69 (78.4)		
Stopped or decreased participation in the classroom or extracurricular activities after the onset of recurrent abdominal pain				
Yes	12 (57.1)	21 (23.9)	8.895	0.003*
No	9 (42.9)	67 (76.1)		
Decreased studying hours after the onset of recurrent abdominal pain				
Yes	18 (85.7)	32 (36.4)	16.630	0.001*
No	3 (14.3)	56 (63.6)		
Change in grade point average after the onset of recurrent abdominal pain				
Yes	9 (42.9)	24 (27.3)	1.951	0.163
No	12 (57.1)	64 (72.7)		

IBS: irritable bowel syndrome; * indicates a significant difference; Note: "with IBS" is Rome IV-based, and total is calculated only among participants with complete information for the Rome IV domains used in the table.

Discussion

The current study ascertained the prevalence of IBS among medical students at Taibah University in Madinah, Saudi Arabia. The study, to our knowledge, is the first to use the Rome IV criteria to explore the relationship between IBS and academic performance. Among the 291 participants in the study, 29(10%) were affected by IBS. IBS had a significant effect on the students' academic performance, but not on their overall GPA. Among all the participants, the highest IBS prevalence was noted in women (13.3%), in those with a family history of IBS (16.8%) and in the participants with food hypersensitivities (18.5%).

The 10% prevalence of IBS is consistent with the 10.5% prevalence reported in a 2016 study at Taibah University.⁹ These rates are higher than the prevalence of IBS in the general population, likely due to the highly stressful lifestyle of medical students, which includes extensive assessments and examinations, extended hours of studying and working, and restricted sleep.⁹ A study in Mecca reported a much higher IBS prevalence of 33% among medical students.⁴ Furthermore, studies conducted in Jeddah and Alkharj reported a prevalence of 31.8% and 21%, respectively. It is noteworthy that the reported prevalence of IBS varies greatly among studies, a phenomenon that may be attributed to the differences between the research samples that have been investigated in various countries and the diagnostic criteria used.^{12,13} A study in Japan revealed an IBS prevalence of 27.5%,¹⁴ which aligns with a study conducted at Al-Neelain University in

Sudan which reported that 27.2% of medical students had IBS.¹⁵

In the current study, IBS was more prevalent in women than in men ($p=0.015$). There were similar results in a Japanese study.¹⁴ Naeem et al.¹⁶ suggested that the contributors to differences in the IBS prevalence between women and men include sociocultural factors, health-seeking behaviours and true biological differences. The effects of oestrogen on the regulatory mechanisms of the brain-gut axis and the stress response are hypothesised to be higher in women than in men.³ In studies done in Pakistan¹⁶ and Malaysia,¹⁷ women had a significantly higher prevalence of IBS compared to men. Conversely, a study at Taibah University involving medical students did not find a significant difference in the IBS prevalence between men (11.5%) and women (9.5%) ($p=0.449$).⁹ Another study found that the IBS prevalence was higher in men than in women (41% and 25%, respectively).⁸

The current study found an association between IBS and academic performance, with 81% of the participants reporting a decrease in attention, 52.4% indicating an increase in absences, and 85.7% noting a decrease in studying hours after the onset of their recurrent abdominal pain. Similarly, a study at Umm Al-Qura University showed that poor academic performance was significantly associated with IBS,⁴ although a study at King Faisal University found no difference in lecture attendance between students with and without IBS.³ IBS challenges negatively impacted medical students' focus, retention and engagement, and thus potentially affected overall performance, but IBS did not significantly impact GPA in the current study ($p=0.163$). In contrast, a study showed a decrease in GPA after IBS onset.³ Such conflicting findings may reflect differences in study designs, sample sizes and methodologies.

According to the current research, a greater percentage of senior students (15%) had IBS symptoms compared to junior students (9.2%) although the difference was not statistically significant ($p=0.252$). A previous study identified a significant difference in the prevalence of IBS between senior and junior students, including a maximum peak seen in fifth-year students.⁹ However, the results of other studies conducted in the Arab world have varied. At King Faisal University, a survey revealed that sixth-year students had the highest prevalence of IBS (44.5%),³ whereas at Ain Shams University in Egypt, a higher prevalence of IBS was noted among junior students (52.8%).⁸ At King Saud University in Riyadh, IBS was most prevalent among fifth-year students, followed by second-year students.²

The current study found that IBS prevalence was significantly higher in participants with a family history of IBS. This finding is consistent with previous research.³ The current study also found that IBS was significantly more prevalent in participants with food hypersensitivity ($p=0.020$). This appears to be in line with the prevalence in the general adult population (1-4%),¹⁸ indicating that food allergies may be a contributing factor in IBS. On the other hand, the current study did not find an association between IBS and the smoking status. A recent study on undergraduate students¹⁹ in Saudi Arabia found that cigarette smoking was linked to increased IBS prevalence.

Interestingly, the number of participants with IBS who reported engaging in less than 150 minutes of exercise per week was greater than that of their counterparts who exercised more. This could suggest that lower levels of exercise may prevent the development of IBS, thereby decreasing its incidence. However, higher levels of exercise may be necessary to reduce the prevalence of IBS among those who already have the condition. A study in Saudi Arabia revealed that students who did not engage in regular exercise had a higher prevalence of IBS (37.3%) compared to those who exercised regularly (26.1%).¹³ Hence, exercise may have a protective effect against the development of IBS. Furthermore, two studies reported a lower prevalence of IBS among individuals who engaged in regular exercise.^{13,14} Physical activity can help alleviate stress, and individuals with IBS who do not exercise may have a poorer ability to cope with stressful situations.¹⁶ In contrast, a study of medical students in Riyadh reported that exercise did not impact the prevalence of IBS.²⁰ This indicates that the relationship between exercise and the prevalence of IBS may vary between different populations. Nevertheless, structured physical activity has been associated with an improvement in IBS symptoms.²¹ Exercise can help reduce psychological stress and lower bodily inflammation, which are significant contributors to the development and worsening of IBS symptoms.²² Additionally, exercise promotes the production of endorphins, which are hormones that enhance mood and reduce stress, leading to the alleviation of IBS symptoms.²³

The current findings align with studies that have reported an association between high levels of exercise and improved IBS symptom scores.^{22,24} However, other studies have indicated that a lower level of exercise is sufficient to alleviate IBS symptoms in healthy individuals, although these studies did not specifically focus on the prevalence of IBS.^{25,26} Existing evidence overall suggests that exercise habits are related to IBS, and that regular physical activity potentially reduces symptom and prevalence of IBS.

The current study has several limitations. The cross-

sectional design did not allow the exploration of causal relationships. Besides, as recruitment was conducted through batch leaders and relied on self-selection, selection bias could not be ruled out. Students with greater interest in the study topic or stronger opinions may have been more likely to participate, which limits the generalisability of the findings. Also, the use of a self-administered questionnaire was subject to recall bias, and the reliance on convenience sampling affected the generalisability of the findings to the entire medical student population. Finally, while the study used the Rome IV criteria, the diagnosis was not confirmed by a clinical evaluation, which could have led to misclassification. IBS is a diagnosis of exclusion. Therefore, it is important to follow a comprehensive assessment before diagnosing it. Furthermore, it is worth noting that symptoms of anxiety can manifest as IBS symptoms, a phenomenon that is especially common among medical students. As such, it is recommended that clinicians check the mental status of medical students, and to refer to specialists those who present with dysfunction in their life, or who have a decreased GPA.

Conclusion

A high occurrence of IBS was noted among the medical students analysed. IBS had a significant impact on academic performance, showing associations with decreased attention during lectures, increased absences, and fewer hours spent studying. Although the study did not reveal a significant association between the presence of IBS and the overall GPA of the students, the prevalence of IBS reiterates the importance of awareness and supportive strategies.

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Author Contribution:

MOZ: Concept, design, data acquisition, analysis, interpretation, drafting, revision, final approval and agreement to be accountable for all aspects of the work.

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