Medical Science

pISSN 2321–7359; eISSN 2321–7367

Prevalence of irritable bowel syndrome and its association with academic performance in Umm Al-Qura University medical students

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To Cite:
Al-Zahrani AS, Al-Shanbari AS, Al-Sulami AS, Zamzami OS, Sindy AA, Albagami S, Shatla MM. Prevalence of irritable bowel syndrome and its association with academic performance in Umm Al-Qura University medical students. Medical Science, 2022, 26, ms266e2203.
doi: https://doi.org/10.54905/disssi/v26i125/ms266e2203

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Peer-Review History
Received: 02 April 2022
Reviewed & Revised: 05/April/2022 to 29/June/2022
Accepted: 01 July 2022
Published: 04 July 2022

Peer-review Method
External peer-review was done through double-blind method.

URL: https://www.discoveryjournals.org/medicalscience

ABSTRACT

Background: Irritable bowel syndrome (IBS) is one of the most prevalent global diseases and national health issues. IBS symptoms have an impact on a patient's quality of life as well as their capacity to work and study. Medical students are affected by IBS, but the rate of IBS is unknown. Accordingly, this study investigates the prevalence and impact of IBS among all medical students at the Umm Al-Qura University (UQU) Medical College. *Methods:* A cross-sectional study including all medical students at UQU. Data were collected using self-administered questionnaires from an online survey using validated ROME III criteria to find out the prevalence of IBS distributed via social media. *Results:* A total of 303 medical students participated. Most participants were male (59.4%), and female (40.6%), In dependence of ROME III criteria, IBS was diagnosed in 100 (33.0%) of the participants. Participants with IBS had a significant association with life stressors (P = 0.000). In addition, according to the hours spent studying, absence from lectures, poor academic performance, and classroom activities, participants with IBS had significantly lower academic performance than those without. (P = 0.000, 0.001, 0.000, 0.000, and 0.000, respectively). *Conclusion:* According to the findings, this study found a high frequency of IBS among participants, especially students in clinical-based years (i.e., from the 4th to 6th year). Furthermore, this research discovered a significant association between students without IBS and stressful life events. Poor academic performance was significantly associated with students with IBS compared to those without IBS.

Keywords: irritable bowel syndrome; academic achievement; students; quality of life

1. INTRODUCTION

Irritable bowel syndrome (IBS) is a painful condition with an unclear etiology, an idiopathic illness in which typical peristaltic and segmental contractions of the colon occur more quite often. (Le and Baudendistel, 2017). While a bowel movement or defecation typically relieves the pain, IBS is associated with changes in stool frequency and form. These changes impact the patient's quality of life and ability to work, and the severity of the symptoms may cause patients to avoid social functions, cancel appointments, or stop travelling. The onset of these symptoms occurs between 20 and 30 years of age or after a history of infectious gastroenteritis (Le and Baudendistel, 2017). The cause of IBS is unknown, but some researchers suggest that several psychological, biological, and social aspects, including sex, nutrition, stress, lifestyle, sleep issues, early poor lifestyle, and mental disorders, may all play a part. (Alsuwailm et al., 2017; Zarnoog et al. 2021; Al-Shammari et al., 2022). While IBS affects both men and women of all ages, women and younger patients are more probable to suffer from IBS. In medical students, extreme amounts of psychological and emotional stress as a result of intense study and exam loads, as well as increasingly intense rivalries for jobs, may create excessive stress (Alsuwailm et al., 2017).

IBS is a widespread functional gastrointestinal disorder, affecting 10%–15% of the general population in countries with advanced economies (Maxion-Bergemann et al., 2006). In North America, the prevalence is estimated to range from 3%–20%, with the majority of countries falling between 10% and 15% (Saito et al., 2002). According to the Rome II criteria, 13.25% of Chinese adolescents and children have IBS (Dong et al., 2005). Both patients and the health care system are burdened by IBS. Although a large percentage of the population suffers from IBS, there is no cure, and only a small fraction of the affected population seeks medical assistance, which varies significantly by country and is based on the diagnostic criteria that were utilized. According to the Manning and Rome II criteria, the incidence of IBS was 8.9% and 9.2%, respectively, among male secondary school students in Al-Jouf, Saudi Arabia (Ibrahim et al., 2013). Medical students are more prone to have frequent IBS than non-medical students as a result of overwhelmed workload throughout their studies due to lengthy courses, numerous exams, long study hours, hard shifts and patient management responsibilities. The high frequency of IBS within medical students can partly be explained by the stress they experience (Wani et al., 2020).

A cross-sectional study conducted at King Saud University for Health Sciences (KSAU-HS) in 2017 assessed IBS prevalence and its relation to anxiety within medical students and found that IBS was shown to be prevalent in 21.1 % of participants, with 19 % of males and 25.9% of females having IBS across all medical students from all years; fifth-year medical students had the highest IBS prevalence, while first-year medical students had the lowest prevalence. The study concluded that higher than 50% of students with IBS had mild to moderate anxiety, indicating a significant relationship between anxiety and IBS (Alaqeel et al., 2017). Another cross-sectional study conducted at King Faisal University in 2017, included medical students and interns assessed the prevalence and distribution of lifestyle-related IBS risk factors, as well as their impact on academic achievement. The study showed that IBS affected 44.5% of the participants, with females (31.8%) having a higher prevalence than males (12.7%). IBS was shown to be more common among students who had undergone emotional stress in the previous six months (25.4%) and in students with an IBS family history (Alsuwailm et al., 2017).

The aim of this research was to find out how prevalent IBS is and its association with academic achievement, which has not been thoroughly addressed by studies in Saudi Arabia, especially among medical students at UQU (Umm Al-Qura University).

2. MATERIALS AND METHODS

Study design

This cross-sectional study was conducted at the Faculty of Medicine, UQU, Makkah, Saudi Arabia, from October to November 2021. Ethical approval (IRB) was obtained from the medical ethics committee of UQU, and participants were informed of the study's objectives. The participants' information was confidential and will not be released.

Study Population

The study included all second- to sixth-year UQU medical students, for a total population of 1200 students. The confidence level was 95% and the accepted margin of error was 5 we estimated the sample size as 292 medical students. Using the OpenEpi sample size calculator program.

Data collection

Data were collected using self-administered questionnaires via an online survey in English distributed via social media (WhatsApp and Twitter). The survey was divided into three components based on closed-ended questions. The first section requested the

student's personal data and medical history. The second section contained the IBS diagnostic criteria, ROME III Diagnostic Criteria: Six months of recurrent abdominal pain associated with approximately two or more of the following: 1) change in stool appearance, 2) increased frequency of bowel movements, and 3) abdominal pain improved with defecation (Gastrointestinal, 2006).
The third section investigated the correlation between IBS and academic achievement.

Data analysis

The Statistical Package for the Social Sciences (SPSS) software was used to conduct the statistical analysis, (version 26; year: 2019, IBM Corp., Armonk, NY, USA). A P-value ≤ 0.05 was considered statistically significant. Based on the variable's distribution, numerical data were presented as the mean, standard deviation (SD), median, and interquartile range. The frequency and percentage were used for categorical variables, and the chi-squared test was used for categorical values and to control confounders.

3. RESULTS

Of the 1,200 undergraduate students, 303 completed the online questionnaire. Table 1 shows the students' demographic information; 180 (59.4%) were male and 123 (40.6%) were female. Of the students, 52 (17.1%), 45 (14.9%), 72 (23.8%), 74 (24.4%), and 60 (19.8%) were in years one, two, three, four, five, and six. Most participants (157 [59.4%]) had a BMI of 18-25 kg/m^2, while 40 (13.2%), 65 (21.5%), 27 (8.9%), and 14 (4.6%) students had a BMI <18, 25-30, 30-40, and >40 kg/m^2, respectively. Most students (203 [67.0%]) exercised less than 2 hours weekly, while 71 (23.4%), 24 (7.9%), and 5 (1.7%) students exercised 3-5, 6-8, and >8 hours weekly, respectively. A total of 113 (37.3%) students had a positive IBS family history, while only 28 (9.2%) students had been diagnosed with IBS. Of the students, 82 (27.1%) used laxatives, 53 (17.5%) had food allergies, such as seafood and shrimp (19 [35.8%]), milk and lactose intolerance (14 [26.4%]), eggs (8 [15.1%]) and coffee (4 [7.5%]) (Figure 1). A total of 235 (77.6%) students experienced stressful life events, and 49 (16.2%) students were smokers or had smoked at some point.

Table 1 Demographic data**.**

Variable	Category	Frequency (%)
Gender	Male	180 (59.4%)
	Female	123 (40.6%)
Academic year	2nd year	52 (17.2%)
	3rd year	45 (14.9%)
	4th year	72 (23.8%)
	5th year	74 (24.4%)
	6th year	60 (19.8%)
Body mass index (BMI; kg/m^2)	<18	40 (13.2%)
	18-25	157 (59.4%)
	25-30	65 (21.5%)
	30-40	27 (8.9%)
	>40	14 (4.6%)
Exercise (hours per week)	<2	203 (67.0%)
	3-5	71 (23.4%)
	6-8	24 (7.9%)
	>8	5 (1.7%)
Diagnosed with IBS	Yes	28 (9.2%)
	No	275 (90.8%)
Family members diagnosed with IBS	Yes	113 (37.3%)
	No	190 (62.7%)
Used laxatives	Yes	82 (27.1%)
	No	221 (72.9%)
Allergies	Yes	53 (17.5%)
	No	250 (82.5%)
Stressful life events	Yes	235 (77.6%)
	No	68 (22.4%)

Smoker or ex-smoker	Yes	49 (16.2%)
	No	254 (83.8%)

Table 2 shows the association between the students diagnosed with IBS using the ROME III diagnostic criteria and the demographic data. IBS was diagnosed in 100 (33%) of the participants, males 55 (55%) had a greater prevalence of IBS than females 45 (45%). There was a significant difference between students with and without IBS who experienced stressful life events. The IBS group found about 91% of participants experienced stressful life events, compared to the non-IBS group at 70.9. ((p = 0.000)), while no significant variations were observed with sex, academic year, BMI, and weekly exercise. In addition, students in higher academic years were found to have higher ROME III scores than 2nd and 3rd years students. Additionally, students with a BMI of 18-25 kg/m^2, < 2 hours of weekly exercise, and stressful events in their life had the highest rates of IBS diagnosis.

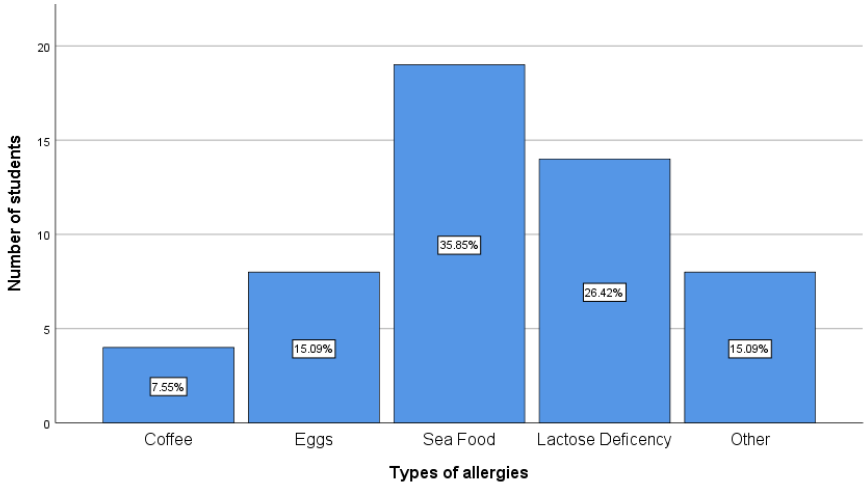

Figure 1 Type of allergies among participants

Table 2 The connection between IBS diagnostic criteria and demographic data

Variable	ROME III diagnostic criteria of IBS		P-value
	IBS (%)	Non-IBS (%)	
Gender			
Male	55 (30.6%)	125 (69.4%)	0.320
Female	45 (36.6%)	78 (63.4%)	
Academic year			
2nd year	13 (25.0%)	39 (75.0%)	
3rd year	14 (31.1%)	31 (68.9%)	
4th year	24 (33.3%)	48 (66.7%)	0.580
5th year	29 (39.2%)	45 (60.8%)	
6th year	20 (33.3%)	40 (66.7%)	
Body mass index (BMI, kg/m^2)			
<18	10 (25.0%)	30 (75.0%)	
18-25	52 (33.1%)	105 (66.9%)	
25-30	19 (29.2%)	46 (70.8%)	0.095
30-40	15 (55.6%)	12 (44.4%)	
>40	4 (28.6%)	10 (71.4%)	
Weekly exercise (hours)			
<2	66 (32.5%)	137 (67.5%)	
3-5	25 (35.2%)	46 (64.8%)	0.471
6-8	6 (25.0%)	18 (75.0%)	
>8	3 (60.0%)	2 (40.0%)	

Stressful life events			
Yes	91 (38.7%)	144 (61.3%)	0.000*
No	9 (13.2%)	59 (86.8%)	
Diagnosed with IBS			
Yes	19 (67.9%)	9 (32.1%)	0.000*
No	81 (29.5%)	194 (70.5%)	
Family members diagnosed with IBS			
Yes	52 (46.0%)	61 (54.0%)	0.000*
No	48 (25.3%)	142 (74.7%)	

The connection between IBS and academic achievement is shown in Table 3. Academic achievement was defined by the number of hours spent studying, an absence from lectures, academic performance, and classroom activities; there were significant differences that IBS group had lower academic achievements among all criteria. (P = 0.000, 0.001, 0.000, 0.000, and 0.000, respectively).

Table 3 The connection between IBS and academic achievement.

		ROME III diagnostic criteria of IBS		P-value
		IBS (%)	Non-IBS (%)	
Have you noticed a decrease in attention during your lectures after the onset of recurrent abdominal pain?	Yes	59 (65.6%)	31 (34.4%)	
	No	41 (19.2%)	172 (80.8%)	0.000*
Have you noticed an increase in your absence from lectures after the onset of recurrent abdominal pain?	Yes	27 (55.1%)	22 (44.9%)	
	No	73 (28.7%)	181 (71.3%)	0.001*
Have you stopped or decreased your participation in the classroom or extra-curricular activities after the onset of recurrent abdominal pain?	Yes	42 (68.9%)	19 (31.1%)	
	No	58 (24.0%)	184 (76.0%)	0.000*
Have you experienced a decrease in your studying hours after the onset of recurrent abdominal pain?	Yes	53 (61.6%)	33 (38.4%)	
	No	47 (21.7%)	170 (78.3%)	0.000*
Have you ever noticed a decrease in your academic performance after the onset of recurrent abdominal pain?	Yes	39 (73.6%)	14 (26.4%)	
	No	61 (24.4%)	189 (75.6%)	0.000*

4. DISCUSSION

In this study, IBS was identified in 100 (33%) UQU medical students based on ROME III criteria. In comparison, a study conducted in Jeddah found a similar prevalence of IBS (31.8%) (Murad et al., 2019), whereas another study conducted in Alkharj City found a lower prevalence of IBS (21%) (Al-Ghamdi et al., 2015). These might be related to using different diagnostic criteria or variances in cultural, ethnic, and nutritional practices among the regions, as well as the sample sizes, different ages, and diagnostic criteria that were employed. The incidence of IBS varies greatly between studies owing to differences in the research samples from various countries and the diagnostic criteria utilized (Wani et al., 2020). One of the studies shows the incidence of IBS in Western countries is approximately 15–24%. These incidence rates vary among populations, such as those in health-related fields. A Saudi study (Alsuwailmet et al., 2017) showed that medical students experienced IBS more frequently than the global rate (Naeem et al., 2012). Similarly, another Saudi investigation found that 29.28% of medical students at Aljouf University suffered from IBS (Mulak et al., 2014).

The current study is consistent with previous publications (Naeem et al., 2012; Mulak et al., 2014), in which 33% of medical students suffer from IBS. Our prevalence rate is greater than the global and national occurrence of IBS (Wani et al., 2020; Naeem et

al., 2012; Mulak et al., 2014). It is possible that this is related to the study's probable effort and overwork over the clinical years. It is important to note that the previous investigations of the occurrence of IBS (Wani et al., 2020; Naeem et al., 2012; Mulak et al., 2014) used different diagnostic criteria. According to a study conducted at Jouf University, medical students have greater prevalence of IBS than non-medical students. This higher prevalence might be due to the underlying stress that medical students experience during their education, including longer courses, more exams, an increased amount of study materials, long hours of sitting in an office, and decreased time for exercise and sleep (Wani et al., 2020). This study found that 32.5% of IBS participants exercised less than two hours per week. Furthermore, some students with IBS have a limited willingness to engage in physical activity.

This study demonstrated a positive relationship between students with IBS and those who exercise for less than two hours per week. Physical activity has been demonstrated to reduce stress; therefore, patients with IBS who don't exercise have a much lower ability to adjust to stressful situations (Naeem et al., 2012). Additionally, academic life is a source of stress that exacerbates IBS symptoms. Most participants in our investigation were stressed and showed signs of IBS, similar to the results of a Saudi study carried out among medical students in Jeddah (Ibrahim et al., 2013).

Some researchers have discovered that people who exercise less have a higher incidence of IBS, whereas others have shown that IBS is much higher in people who sleep less (Wani et al., 2020). IBS was much higher in participants who slept fewer than 8 hours per day compared to those who slept more than 8 hours per day. In addition, academic life is a stressor that exacerbates IBS symptoms as a recent study found that approximately 91 (38.7%) participants who experienced stressful events throughout their lives also experienced IBS symptoms. Many studies have found that IBS is present at significantly high rates within and between students who suffer from emotional stress. In a cross-sectional study of 173 medical students and interns in Al-Hasa, they found significantly high levels of IBS among students who experienced emotional stress over 6 months (25.4%), as well as a decrease in academic performance (Alsuwailm et al., 2017).

Our findings demonstrated a connection between IBS and a reduction in academic performance. Similarly, Ibrahim et al., (2013) found that students in lower grades had a greater prevalence of IBS. In this study, more females had IBS than males. This is consistent with previous research, particularly among medical students with IBS. Among Malaysian medical students, IBS was identified more frequently in females compared to males (Tan et al., 2003), and another study conducted in Pakistan indicated that 15.7% and 84.2% of patients diagnosed with IBS were males and females, respectively (Naeem et al., 2012). A study conducted in Japan included medical and nursing students also revealed that females had a greater prevalence of IBS (Okami et al., 2011).

Many studies have found that the reason for the disparity in IBS prevalence between the sexes remains unknown. According to Naeem et al., (2012) the disparities in the prevalence between males and females are determined by sociocultural features, health-seeking behavior, and biological differences. In addition, females may experience IBS more often due to the influence of estrogen sex hormones on the regulatory processes of the brain-gut axis, as well as sex differences in the stress response, which are observed to be much more prevalent in females (Mulak et al., 2014). Furthermore, females are more prone to suffering from mental health issues and sleep disturbances, which are commonly linked to IBS. A sex-based strategy should be considered for clinical application.

The occurrence of IBS was greater among pre-senior and senior students (i.e., high academic levels). This might be correlated to the increase in stressors, including work pressures, choosing a specialty, and overthinking about postgraduate life, that occur in the clinical years (i.e., from the 4th to 6th year). During the two years of basic sciences in medical school, they may have a reduced exposure to clinics and eventually experience stress. In contrast, a study conducted in Ontario, Canada, found that there were no significant variations in the prevalence of IBS across basic and practical students (Wells et al., 2012).

This study also demonstrated a relationship between IBS and lower academic performance. Multiple worldwide studies have shown that people with IBS experience a significant reduction in their grade point average. In a cross-sectional conducted at KFU in Al-Hasa, students noticed that a decrease in attention during lectures occurred after the onset of the recurrent abdominal pain and in addition, the majority of participants reported an increased absence from lectures after the onset of recurrent abdominal pain, although there was no evident variation in the lecture attendance rates between students with and without IBS (Alsuwailm et al., 2017; Wells et al., 2012). Most students diagnosed with IBS observed that their participation in the classroom or extracurricular activities stopped or decreased after the onset of recurrent abdominal pain. IBS, a major problem affecting many medical students and decreasing their academic performance, needs to be addressed by educational institutions to help mitigate the adverse effects. The purpose of this research was to investigate frequency of IBS and its detrimental effects among medical students at UQU Medical College in Saudi Arabia.

Although the clinical examination did not diagnose IBS in any of the medical students, some of the reported symptoms were similar to the IBS symptoms based on to Rome III diagnostic criteria. We recommend further investigation to achieve a representative sample among all medical colleges in Saudi Arabia. Moreover, female and junior students demonstrated lower rates

of IBS compared to clinical-year students. The current study used a validated survey to investigate IBS, and it's the first such study of medical students in Makkah.

5. CONCLUSION

IBS showed a significant prevalence among medical students in Makkah. Accordingly, we recommend awareness programs for medical students, including mandatory national detection programs that enable early detection of IBS within medical students in Saudi Arabia.

Acknowledgment

The authors gratefully acknowledge the cooperation of all participants.

Consent for participation

Informed consent was obtained from all the participation.

Ethical approval

The research was conducted after the approval of Ethics Committee at Umm Al-Qura University (HAPO-02-K-012-2021-11-846).

Funding

This study has not received any external funding.

Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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