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Prevalence and association between irritable bowel syndrome and stress among medical students in Al Qunfudah

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ABSTRACT

The most prevalent type of functional gastrointestinal disorder is irritable bowel syndrome (IBS). This illness has a complex etiology and may be caused by several factors. Medical students were discovered to be at an increased risk of having IBS. The purpose of this study was to determine the prevalence of IBS and its association with stress among medical students at Al Qunfudah medical college. This study was a cross-sectional study; data were gathered using a pre-structured self-administered questionnaire that included demographic information, Rome IV criteria, and the Perceived Stress Scale. This study enrolled 290 students, giving a response rate of 78.9%. IBS was prevalent at a rate of 14.8% (40 of 290). Males were more likely to suffer from IBS than females (17.8% vs. 12.1%). Between IBS and stress, a statistically significant association was established ($P=0.022$). A considerable percentage of IBS was discovered among Al Qunfudah medical college students. IBS and stress were significantly associated, whereas other variables were not associated with IBS.

Keywords: irritable bowel syndrome, stress, medical students, prevalence, Saudi Arabia

1. INTRODUCTION

Prevalence and Association between irritable bowel syndrome and stress among Medical Students in Al Qunfudah irritable bowel syndrome (IBS) is a chronic and relapsing gastrointestinal disorder that affects the large intestine (Lovell & Ford, 2012). IBS is the highest frequent form of functional gastrointestinal disorder (FGID), often known as a gut-brain interaction disorder (Soares, 2014). It is defined by recurring abdominal discomfort that

occurs in conjunction with changes in bowel movement (Adriani et al., 2018; Al-Zahrani et al., 2022). However, IBS is more complicated and the consequence of a variety of different variables (Drossman, 2016). These variables are associated with abnormal motility, visceral hypersensitivity, altered mucosal and immunological function, changed gut microbiota, and abnormal central nervous system processing. Although, several risk factors contribute to IBS (Alharbi, 2018). Factors include sleep problems, genetic susceptibility, psychological stress, eating habits, tobacco use, and physical exercise. Additionally, IBS is recognized as a condition that primarily affects individuals younger than fifty years with a female predominance (El-Salhy, 2012).

According to a meta-analysis of 81 studies from various countries, this condition was prevalent among 11.2% of the general public (Lovell & Ford, 2012). As a result, IBS has a financial cost and increases the demand for healthcare services (Agarwal & Spiegel, 2011). The cost of IBS was estimated to be more than \$20 billion in Agarwal and Spiegel's (2011) report in the United States. Twelve percent of primary care visits are for IBS, which brings about 2.2 million prescriptions (Qureshi et al., 2016). Additionally, IBS has a detrimental effect on one's quality of life and affects job productivity (Maxion-Bergemann et al., 2006; Al-Shammari et al., 2022). However, due to the absence of a standard diagnostic test, diagnosis relies on symptoms-based criteria like Manning, Rome I, II, and III (Soares, 2014). Rome IV is currently commonly used to diagnose IBS (Bai et al., 2017). To meet Rome IV criteria, patients must have had recurrent abdominal discomfort on average at least once a week for the preceding three months, commencing at least six months before diagnosis (Lacy & Patel, 2017). Plus, two or more of the following symptoms: the pain related to bowel movement, accompanied by a change in frequency or appearance of fecal matter.

Medical students in Pakistan and Korea had prevalence rates of IBS of 28.3% and 29.2%, respectively (Jung et al., 2011; Naeem et al., 2012). Western countries, on the other hand, have a lower prevalence; a Canadian study found that 19.1% of pre-clinical students and 22% of clinical students had the disorder (Wells et al., 2012). IBS prevalence was reported to be 31.8% among medical and internship students at King Abdulaziz University in Jeddah in 2013, Saudi Arabia (Ibrahim et al., 2013). On the other hand, in one of the medical schools in Riyadh, a frequency of 21% was reported (Alaqeel et al., 2017). Additionally, medical students were shown to have a greater frequency of IBS than students from other fields.

According to Chinese research done at two institutions, medical students had a greater chance of developing IBS than engineering and science students (Chu et al., 2012). Similarly, in Lebanon, medical students accounted for more than half of all IBS cases (Costanian et al., 2015). Most of the published research in Saudi Arabia has not used Rome IV criteria; this is one of the few exceptions. Additionally, no prior study has examined the prevalence of IBS or stress among students at Al Qunfudah medical college. As a result, such research is necessary. This study aimed to quantify IBS prevalence and its association with stress among Al Qunfudah medical college students. We predicted that there is a link between IBS and stress among medical students.

2. MATERIALS AND METHODS

Cross-sectional research was conducted to determine the prevalence of IBS and its association with stress. Before starting the research, a Pilot study was done during the period of November 2019 to December 2020, research took place at Umm Al-Qura University, AlQunfudah medical college campus. This study was a complete enumeration that recruited all students enrolled at AlQunfudah medical college from their second to the sixth academic year. Study duration took place from 19/January /2022 till 15 march/ 2022 and the exclusion criteria for this study were considered incomplete responses. Trained data collectors clarified the study objectives to all participants and ensured that the data would be kept confidential. In addition, the participants were assured of the survey's anonymity and instructed not to write any personal information on the questionnaire sheets.

An English pre-structured self-administered survey was distributed during tabled classes and collected back on the same set. The data collectors briefed the participants about the study in English. The questionnaire is composed of three parts. The first part acquired demographic data (gender, residency status, height, and weight). Also, included other information about the academic year, grade point average (GPA), smoking, coffee consumption, and family history of IBS. The second part was the English version of the Rome IV criteria for IBS diagnosis. Rome IV criteria in 2016 replaced Rome III, which aimed to improve the diagnostic tool based on new literature results, for example, new information about microenvironment and gut-brain interactions (Bai et al., 2017). The last part of the survey aimed to measure the stress among the students using the 10-Item Perceived Stress Scale (PSS-10). The PSS-10 is the most frequently used and validated psychological test for assessing stress (Cohen, 1994). It was created in 1983, although it is still often used to evaluate stress. It calculates stress depending on the number of challenging events in the previous month. Each question received a response score between 0 (never) and 4 (very often). The total PSS-10 score ranges between 0 and 40, with higher numbers indicating increased stress.

The data was received as answered sheets. The sheets were entered into Microsoft Excel and then analyzed using SPSS Version 23.0. (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp). For Rome IV criteria, the result was either had IBS or not.

Likewise, PSS-10 was calculated and divided into three groups (low, moderate, and high). BMI is calculated by dividing the students' height in centimeters (cm) and weight in kilograms (kg) into four categories: underweight (18.5), normal weight (18.5–24.9), overweight (25–29.9), and obese (30.0) or greater.

Descriptive and inferential statistics were performed. The association between the categorical dependent (IBS) and different independent variables was observed and quantified using Pearson's chi-square test. Following a multicollinearity check, Binomial logistic regression was used to predict the relationship between IBS and each variable. A P-value less than 0.05 considered significant and an odds ratio with a 95% confidence interval reported.

Ethical approval for this study was obtained from the Biomedical Ethics Committee of Umm Al-Qura University (HAPO-02-K-012-2022-01-919).

3. RESULTS

Out of 342, 290 students were approached. The final valid number involved in the analysis is 270, with 20 responses excluded due to randomly incomplete data. Male participants represent 129 (47.8%), whereas 141 (52.2%) are females, yielding a response rate of 78.9%. Based on the collected data, 40 participants met the Rome IV criteria for diagnosing IBS, revealing a prevalence of 14.8% overall. Figure 1 exhibits a higher prevalence among male participants (17.8%) compared to (12.1%) for females, IBS prevalence varied by academic year, with the largest frequency occurring in the third year, followed by the sixth year. The vast majority of students, 84%, lived with their families. However, the proportion was almost equal across students living with their families (15%) and those living in private apartments (14%). The prevalence was greater among students with GPAs higher than 3.75. As shown in Table 1, no statistically significant association between these factors (gender, academic year, residence status, and GPA) and IBS was discovered.

Table 1 The association between irritable bowel syndrome (IBS) and demographic characteristics, and the grade point average of medical students at AlQunfudah medical collage

Variables	IBS (No.40)	Non-IBS (No. 230)	P	OR	95% CI	
					Lower	Upper
Gender						
Female	17(12.1%)	124(87.9%)	.182	1.583	.803	3.119
Male	23(17.8%)	106(82.2%)				
Academic year						
2 nd	9(12.9%)	61(87.1%)	.524			
3 rd	10(21.3%)	37(78.7%)				
4 th	6(12.5%)	42(87.5%)				
5 th	6(10.7%)	50(89.3%)				
6 th	9(18.4%)	40(81.6%)				
Residency status						
Private house	6(14%)	37(86%)	.862	1.086	.426	2.771
With family	34(15%)	193(85%)				
GPA						
3.75 and more	22(17.2%)	106(82.8%)	.297	.699	.356	1.373
Less than 3.75	18(12.7%)	124(87.3%)				

IBS prevalence was greater in smokers (24%) than in nonsmokers (13.9%). However, the majority of research participants, 90.7%, were nonsmokers. Approximately half of the people (49.6%) were of normal weight, while (20.7%) and (8.2%), respectively, were overweight or obese. In any case, no statistically significant association was detected between smoking and BMI in patients with IBS. Nearly half of the survey respondents did not drink coffee daily. The prevalence was lower among those who did not drink coffee (10.8%) compared to those who drink 1-2 or 3 or more cups per day (18.2%), (19.5%), respectively. Although 38.5% of individuals reported positive family history, the association was not statistically significant. Additional information is provided in Table 2.

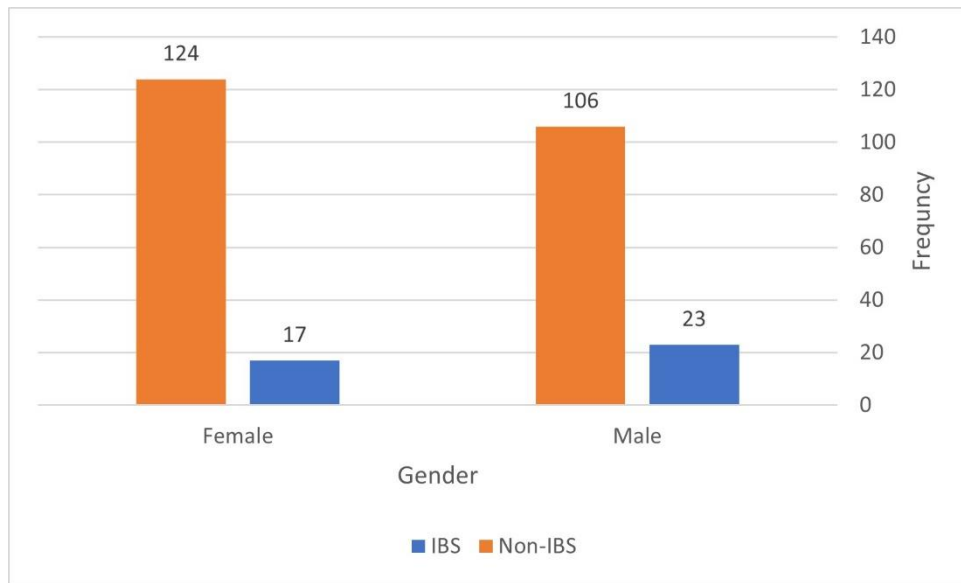


Figure 1 Frequency of Irritable Bowel Syndrome (IBS) Based on Gender among Medical Students at AlQunfudah Medical College

Table 2 Association between irritable bowel syndrome (IBS) and smoking, coffee consumption, body mass index (BMI), and family history in medical students in AlQunfudah medical college

Variables	IBS (No.40)	Non-IBS (No. 230)	P	OR	95% CI	
					Lower	Upper
Smoking						
Yes	6(24%)	19(76%)	.175	.510	.190	1.369
NO/Ex-smoker	34(13.9%)	211(86.1%)				
Coffee						
None	14(10.8%)	116(89.2%)	.193			
1-2 per day	18(18.2%)	81(81.8%)				
3 or more per day	8(19.5%)	33(80.5%)				
BMI						
Underweight	5(8.6%)	53(91.4%)	.421			
Normal	24(17.9%)	110(82.1%)				
Overweight	8(14.3%)	48(85.7%)				
Obese	3(13.6%)	19(86.4%)				
Family history of IBS						
Yes	15(14.4%)	89(85.6%)	.886	1.052	.526	2.104
No/I don't know	25(15.1%)	141(84.9%)				

Table 3 shows the association between IBS and stress is statistically significant, with IBS being much more prevalent in people with a high degree of stress. Table 4 reveals that IBS risk among those who consume one to two cups of coffee daily is 2.5 times greater than non-coffee drinkers (statistically significant).

Table 3 Association between irritable bowel syndrome (IBS) and stress in medical students in AlQunfudah medical college

Variables	IBS (No.40)	Non-IBS (No. 230)	P
stress			
Low	2(10%)	18(90%)	.022
Moderate	27(12.7%)	186(87.3%)	
High	11(29.7%)	26(70.3%)	

Table 4 Logistic regression analysis of predictors of IBS among medical students in AlQunfudah medical college

Variables	B	Wald	P	OR	95% CI	
					Lower	Upper
Gender (Ref: female)						
Male	.305	.542	.462	1.356	.603	3.051
Academic year (Ref: 2 nd)		5.305	.257			
3 rd	.933	2.809	.094	2.541	.854	7.563
4 th	.146	.058	.809	1.157	.353	3.791
5 th	-.191	.102	.750	.826	.255	2.674
6 th	.697	1.368	.242	2.007	.625	6.448
Residency status (Ref: private)						
With family	-.109	.042	.837	.897	.318	2.530
GPA (Ref: 3.75 and more)						
Less than 3.75	-.580	1.958	.162	.560	.249	1.261
BMI (Ref: normal)		2.733	.435			
Underweight	-.872	2.533	.112	.418	.143	1.224
Overweight	-.347	.508	.476	.707	.273	1.833
Obese	-.389	.274	.601	.678	.158	2.909
Coffee (Ref: Non)		4.916	.086			
1-2 per day	.900	4.254	.039	2.461	1.046	5.789
3 or more per day	.929	2.986	.084	2.532	.883	7.261
Smoking (Ref: NO/Ex-smoker)						
Yes	.704	1.407	.235	2.023	.632	6.476
Family history of IBS (Ref: Yes)						
No/I don't know	.198	.270	.603	1.219	.577	2.575
Stress (Ref: Low)		7.520	.023			
Moderate	.221	.075	.075	1.247	.257	6.057
High	1.417	2.639	.104	4.124	.746	22.782
Constant	-2.831	8.574	.003	.059		

4. DISCUSSION

Numerous studies have indicated a higher chance of having IBS in medical students (Chu et al., 2012; Costanian et al., 2015). IBS is delineated as a chronic and relapsing illness that affects the large intestine (Lovell & Ford, 2012). IBS is the most common kind of FGID (Soares, 2014). The present research aims to quantify the prevalence of IBS at AlQunfudah medical college and examine its association with stress. According to this study, IBS was shown to be prevalent in 14.8% of medical students between the second and sixth years of medical school. In SA, a study published in 2020, which enrolled medical students from their pre-medical year to the fifth year, showed a prevalence of 12% (Ahmed et al., 2020). Similarly, a nationwide survey conducted among different cities in Saudi Arabia found IBS prevalence to be 17% (Alzaharani et al., 2018). Broadly, in a Malaysian investigation, an outcome of 14.7% is reported (Seger et al., 2020). They are in line with this study's findings, which we thought because all these studies employed Rome IV criteria. Without a doubt, the frequency of IBS differed between studies due to a variety of factors, including the diagnostic criteria utilized, the research population, the study procedure, and sociocultural variations. To name a few, a study conducted in Riyadh, Saudi Arabia, discovered a prevalence of 21.1% among medical students (Alaqeel et al., 2017). The same is true for research conducted in other nations, such as Korea, Beijing, and Karachi, where a much greater prevalence of 29%, 33%, and 28%, respectively, was recorded (Jung et al., 2011; Liu et al., 2014; Naeem et al., 2012).

Exposure to stress causes changes in brain-gut interactions, which might raise the risk of gastrointestinal disorders such as IBS and other FGID (Konturek et al., 2011). Stress affects gut physiology by changing the gastrointestinal system's motility, increased visceral perception, intestinal permeability, alterations in gastrointestinal secretion, adverse effects on mucosal blood flow, and gastrointestinal mucosa regenerative capacity. Medical students expose to tremendous stressors due to the nature of their studies and the length of time required completing their academic and clinical requirements. Besides increases their fears of future job competition and responsibilities. These facts corroborate our observation that IBS and stress have a significant association. Our finding corroborates with Ibrahim et al., (2013), who reported a substantial association among individuals who had undergone stress.

Surprisingly, IBS was more prevalent in male students (17.8%) than in females (12.1%), with no significant association. However, few studies agree with this finding (Husain et al., 2008; Jafri et al., 2005; Mohammadunnabi & Ekram, 2015). This finding contrasts with Elhosseiny et al., (2019), who observed IBS is significantly associated with the female gender. Additionally, a systematic review found that the uppermost research conducted among medical students indicated that females had a higher chance of developing IBS than males (Ibrahim, 2016). Likewise, in an Iranian systemic review, out of eleven studies, nine reported female predominance, while only two studies marked male predilection (Jahangiri et al., 2012). Anyhow, the actual cause of gender differences in IBS is indefinite (Qureshi et al., 2016). Although, it hypothesizes that female predominance is due to the fluctuation of reproductive hormones and their effects on intestinal mortality (Anbardan et al., 2012). Besides, stress encountered during the menstrual cycle contributes to worsening IBS symptoms.

The current work revealed similar percentage of IBS prevalence among different academic years, with the third year being the highest. However, it is non-significant. Similarly, Wells et al., (2012) discovered a prevalence of (19.1%) and (22%) among pre-clinical and clerkship students, respectively, in Ontario, Canada, with no significant difference in the frequency of IBS between them. Moreover, Iranian research revealed a higher prevalence among junior students than seniors (Mansour-Ghanaei et al., 2009). However, our findings were contrary to those obtained by Alsuwailm et al., (2017), where the sixth year was the highest, and those obtained by Ibrahim et al., (2013), where students in the high levels (fifth, sixth, and interns) were the most common in IBS prevalence. In our cohort, a possible explanation for IBS being most prevalent in the third year is introducing the integrated modules system during this year, with curriculum overload and frequent exams over a brief period. IBS, however, was more prevalent among students with a GPA of 3.5 or higher. This finding is similar to a study conducted at King Abdulaziz University, in which individuals with high GPAs reported experiencing more IBS than others (Ibrahim et al., 2013). Indeed, maybe it lies in the fact that the continual desire of this group to achieve high scores alongside other lifestyle changes currently renders them favorable for IBS.

IBS was almost equally prevalent among those living with their families and in private housing; however, this result was non-significant. According to a study conducted at King Faisal University in Saudi Arabia, individuals living with their families have a higher frequency of 37%, compared to 5% in private housing and 1% in school dorms (Alsuwailm et al., 2017). On the contrary, this was contrasted by Costanian et al., (2015) and Mansour-Ghanaei et al., (2009) studies. They found a higher frequency of IBS in participants who lived away from their families. A well-evident predictor of IBS is family history. This study revealed a 38.5% of the participants reported a positive history of this condition among their families, but with no statistical significance. This finding is in harmony with investigations held in Saudi Arabia, where IBS prevalence was significantly higher among subjects with positive

family history than others (Alsuwailm et al., 2017; Alzahrani et al., 2018). Similarly, an Egyptian study discovered that family history and IBS have a substantial association, with the prevalence being 35.8% (Elhosseiny et al., 2019). Furthermore, a familial-based case control conducted in the US found that IBS strongly aggregates in families (Saito et al., 2010).

Limitation

This research, however, is subject to some limitations that affect the validity of the findings. Firstly, the survey is self-administered, which may affect the accuracy of the collected data. Besides, the possibility of recall bias because our measurements, i.e., Rome IV and PSS-10, are based on asking about events within the previous six months. Another limitation, as the study design is cross-sectional, we cannot infer any causality between IBS and independent variables. Also, the chance of the presence of uncontrolled confounding variables influences the association between stress and IBS. Finally, we had no criteria to screen for red flags and exclude subjects accordingly.

5. CONCLUSION

A prevalence of 14.8% prevailed among medical students in AlQunfudah medical college. Our finding supports the evidence that stress and IBS are significantly related. On the college campus, we recommend stress coping strategy campaigns. Additionally, education about this condition's symptoms and effects is warranted. Also, we encourage students experiencing IBS symptoms to seek a further examination from physicians to manage the severity of this condition and its influence on their life quality. Further prospective studies with an in-depth focus on the confounders to determine the underlying etiologies of this condition are recommended.

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Author contributions

The manuscript's preparation and editing were a collaborative effort by all the authors. Omar Y. Alfaqih handled the study's planning, data entry, and statistical analysis. Additionally, He has written the results part as well. Yahya M. Alnashri contributed to the writing of the methodology and discussion. Also, Yahya M. Alnashri carried out the final draft of the manuscript editing and revision. Mohammed M. Alharbi was in charge of the literature review and drafting of the introduction. Omar Babateen, Mohamed A Elhefny, Abdullah A Saati, and Anas Abdulaziz Sarhan have reviewed the discussion parts and approved the final manuscript. The general supervisor of this work is Dr. Mohamed A.M. Iesa, who offers directions and corrections.

Ethical approval

The study was approved by Biomedical Ethics Committee of Umm Al-Qura University (HAPO-02-K-012-2022-01-919).

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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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