

Prevalence of IBS among Medical Students and Its Relation with Anxiety and Depression: A Cross-Sectional Study

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Abstract: ***Objectives:** Irritable Bowel Syndrome (IBS) is a common functional gastrointestinal disorder & is the most commonly diagnosed one by gastroenterologists. In this study, we aim to explore the frequency of IBS among medical students in Qassim, and the factors associated with this disorder among them. **Methods:** A cross sectional study was carried out among medical students of all academic levels in three local universities in Qassim region; Qassim University, Unizah as well as Alrajhi colleges of medicine. Data for the study were collected throughout the 1st semester of the academic year 2015-2016 using a validated, self-administered and anonymous paper questionnaire. The questionnaire included three main sections: Demographics, Rome III Criteria and Hospital Anxiety and Depression Scale (HADS). **Results:** Among 511 students completed the study and of those 70 (13.7%) had IBS. Senior medical students are 3.61 times more likely to have IBS than juniors ($p < 0.001$). Depression was significantly associated with IBS ($p = 0.042$). Stepwise logistic regression showed that chronic health problems, more advanced academic level and personal history of IBS were significant predictors for IBS. **Conclusion:** The prevalence of IBS is 13.7% among medical students in Qassim region. Depression, age, living situation, advanced academic years, family or personal history, or an episode of travellers' diarrhoea were the main predictors of IBS. Offering psychological and emotional support along with stress management courses in order to deal with stress is recommended.*

Keywords: Irritable bowel syndrome, medical students, stress, anxiety, depression

1. Introduction

Irritable Bowel Syndrome (IBS) is a common functional gastrointestinal disorder characterized by frequent alteration in bowel habits along with abdominal pain or discomfort and/or bloating, in the absence of organic lesion in the intestine. (1,2). It's considered as the most frequently diagnosed disorder by gastroenterologists, and, in the US alone, the physician visits for IBS account for 2.4 and 3.5 million annually (3,4). It is ranging widely among all societies and socio-economic classes (5). The prevalence of IBS ranges from 9–23% worldwide. However, it varies from one country to another according to the diagnostic tool used. Based on Rome III criteria, IBS affects about 10-15% and 10-20% in North America, and Western countries, respectively (3,7,8). On the other hand, two different studies were conducted in Saudi Arabia; Makkah and Aljouf. In Makkah, 26.7% of the subjects were diagnosed with IBS by using Rome III criteria. In Aljouf, the prevalence of IBS was 8.9% by using Manning criteria, and 9.2% by using Rome II criteria. (6,9).

There are other factors that may impact the prevalence of IBS including age and gender. IBS affects females more than males, and is more common among those who are under 45 years of age (10, 11, 16). IBS poses a great burden on patients' quality of life, and is considered as the 2nd most common cause of work absenteeism (12,13, 14).

A large number of university students experience psychological issues like stress and anxiety. A study was done in China which revealed that medical students are at higher risk of developing IBS compared to science and engineering students (1). This result may be due to the fact

that medical students are continuously dealing with psychological stress throughout their medical years because of numerous exams and long courses. In Jeddah, Saudi Arabia, the prevalence of IBS among medical students was high accounting for 31.8% (15).

Regarding the diagnosis of IBS, different diagnostic criteria have been established such as Manning criteria, Rome criteria I and Rome Criteria II (17). However, the Rome III criteria is the current diagnostic tool for IBS (18). This questionnaire was created by the Rome III committee, in 2006. The criteria classify the IBS subtypes using stool consistency that shows an accurate diagnosis of IBS because it's the closest to the clinical criteria (1).

Despite the fact that IBS is considered as a common disorder in Western countries, it's still an area of little research in Arab countries, especially in Saudi Arabia. Furthermore, a few studies have investigated the prevalence and the risk factors in college students, specifically medical students. Moreover, the literature lacks sufficient information concerning medical students of Qassim region. Thus, our goal for this study is to estimate the spread of IBS among medical college students of Qassim region, and to identify the factors associated with it to aid for future diagnosis and prevention. In addition, we will determine the effect of increase in academic level on the frequency of IBS as well as finding correlation between anxiety/ depression and IBS.

2. Methods

a) **Study Setting and Design:** An observational cross sectional study was conducted in April and May 2016 of the academic year 2016-2017 in Qassim, Saudi Arabia.

- b) **Ethical Consideration:** This study was reviewed and approved by Regional Research Ethics Committee – Qassim Region.
- c) **Inclusion and Exclusion Criteria:** The study included medical students of three local universities in Qassim region; Qassim University College of Medicine, Unizah College of Medicine as well as Alrajhi College of Medicine. Participants have to be 18 - 30 of age and enrolled in one of the three universities as undergraduates.
- d) **Sample Size:** Because this study is a cross-sectional one, we tried to include everyone in every academic level from both genders; males and females.
- e) **Data Collection Method and Instruments:** Data collectors approached each and every one of them from all academic levels, and have given a full verbal explanation of the study, its goals and importance. Participants were told how and why they were selected and that they're not obligated to take part in the study. They were then informed of their rights, including their full right, and under any circumstances, to leave the study at any stage. They were also notified that whatever information they give will be kept confidential and are going to be only used for research purposes; they also have the right to not answering any question. Participants weren't given any incentives. Those who have given a verbal consent to take part, were handed a copy of the survey used in the study, and were told to ask for a clarification about any question they don't understand in the survey. Respondents who reported the presence of one or more red-flag item were excluded out of the study.

Data for the study were collected throughout the 1st semester via validated, self-administered and anonymous paper questionnaire. The tool was piloted by distributing it among 15 participants. Every participant was asked to evaluate the following points: A) whether the questionnaire design and arrangement positively motivate participants to complete the survey? B) How long does it take to complete every questionnaire? C) Are the questions understood, comprehensive, easy to read and whether they were interpreted similarly by all respondents? D) Is there any systematically missed item? E) whether responses sufficiently and appropriately grouped? F) whether the questions cover the study objectives?. Certain modifications were made accordingly including editing the demographics section design, questions, and range of Grade Point Average responses. The latter were modified into (≥ 4 , or < 4) rather than (< 3.0 , $3.0 - 3.49$, $3.5 - 3.99$, $4.0 - 4.49$, ≥ 4.5). The questionnaires are divided into 3 main parts; Sociodemographic data, IBS diagnostic criteria and a questionnaire to assess anxiety and depression. Sociodemographic characteristics, daily life habits as well as history of Irritable Bowel Syndrome were obtained as baseline information. Amongst these information, the followings were asked about: age, gender, marital status (Single, Married), living status (Living alone, with family or with friends), which college of Medicine the participant is a student at (Qassim University, Unizah College, Suliman Alrajhi), academic year (1st, 2nd, 3rd, 4th, 5th), current Grade Point Average (< 4 , ≥ 4), current parents' situation (living together, divorced, dead "one or both"), average family income (SAR < 4000 , $4000-10,000$, $> 10,000$), height

"in centimeters" and weight "in kilograms", exercising regularly (yes, no), common food source (Home, Restaurant), frequency of fast food consumption (daily, 4-6 times, 1-3 times, never), daily sleeping hours (< 8 hours, 8 hours or more), history of food allergies (yes, no), cigarette smoking status (currently a smoker, previous smoker, never smoked), family history of IBS (yes, no), and personal history of IBS (yes, no). For the IBS diagnostic criteria questionnaire, ROME III criteria was used. According to ROME III Criteria, IBS is diagnosed based on the presence of a recurrent abdominal pain or discomfort for at least 3 times/month during the past three months. This pain, or discomfort, is accompanied by two or more of the following: a) Improvement with defecation. b) Onset associated with a change in the form (appearance) of stool. c) Onset associated with a change in the stool frequency. A duration of six months from the onset of the symptoms is required to diagnose IBS. IBS is further classified into different subtypes based on the predominant symptom, either diarrhea-predominant (IBS-D), constipation-predominant (IBS-C), mixed (IBS-M), or un-subtyped IBS (IBS-U). Diagnosing IBS may possibly be established by following the ROME III criteria after excluding the red flag symptoms that include fever, vomiting, rectal bleeding, weight loss which might hint at other diagnoses (1). Omitting the red flag symptoms renders 100% specificity and 65% sensitivity in diagnosing IBS by using ROME III criteria (3). In our study, the following items were included as red flags (1); blood in the stools, black stools, vomiting blood, anemia, fever, unintentional weight loss of 4.5 kilograms over the previous three months, family history of colon cancer, inflammatory bowel disease, and/or celiac disease. Respondents who reported the presence of one or more red-flag items were excluded out of the study. To assess the level of anxiety as well as depression, Hospital Anxiety and Depression Scale (HADS) was used. It's a valid standardized tool containing 14 questions; seven of which are set to assess anxiety (HDAS-Anxiety) and the other seven questions are for depression (HDAS-Depression) (33).

Statistical Analysis

The prevalence of IBS among all students was calculated and then compared between groups using the Chi-squared test or Fisher's exact test, as appropriate for categorical variables and the mann whitney test for continuous variables. The relationship between student characteristics and the odds of IBS were also explored using univariable logistic regression models with results expressed as Odds ratio (OR) with 95% confidence intervals (95% CI). Independent predictors of IBS were identified using a forward selection approach, with variables with $p < 0.05$ added to the model. Associations between characteristics and type of IBS (IBS-M versus other) were explored using chi-squared, fishers exact and mann-whitney tests with odds ratio estimated as above using logistic regression. Analysis was conducted using SPSS v 22.

3. Results

In total 511 students completed the study and of those 70 (13,7%) had IBS (Figure 1). Among those who had IBS,

IBS-M was the most common type reported by 45 students (64.3%), with IBS-C reported by 10 (14.3%), IBS-D by 13 (18.6%) and IBS-U by 2 (2.9%).

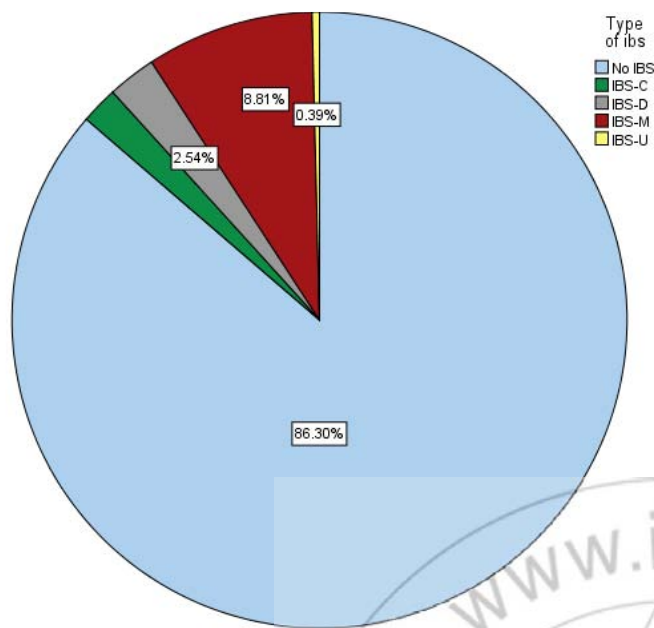


Figure 1: IBS status of all respondednts.

Table 1: Demographic characteristics and odds of IBS.

FE=Fisher's exact test, MW=Mann whitney

	Non IBS	IBS	X ²	p-value	Odds ratio	95% CI
Student gender						
Male	280 (85.6)	47 (14.4)	0.34	0.55	1	
Female	161 (57.5)	23 (12.5)			0.85	0.50 to 1.45
Student age	21 (20 to 23)	22 (21 to 24)	MW	0.004	1.25	1.08 to 1.45
Marital Status						
Single	422 (86.5)	66 (13.5)	FE	0.539	1	
Married	19 (82.6)	4 (17.4)			1.35	0.44 to 4.08
Living status						
Alone	41 (80.4)	10 (19.6)	10.5	0.005	1	
Family	313 (84.6)	57 (15.4)			0.75	0.35 to 1.58
Friends	87 (96.7)	3 (3.3)			0.14	0.04 to 0.54
Current Parent status						
Living Together	380 (86.2)	61 (13.8)	0.81	0.664	1	
Divorced	17 (81.0)	4 (19.0)			1.47	0.48 to 4.50
Dead "one or both"	41 (89.1)	5 (10.9)			0.76	0.29 to 2.00

There was a difference in levels of IBS across the three universities ($p=0.013$) with IBS most common in Qassim university and least in Onizah college (Table 2). As academic level increased the odds of IBS also increased, this those in 5th year 3.61 times more likely to have IBS than 1st years ($p<0.001$). GPA was not associated with IBS risk.

Table 2: Academic characteristics and odds of IBS.

	Non IBS	IBS	X ²	p-value	Odds ratio	95% CI
University						
Qassim University College of medicine	241 (82.8)	50 (17.2)	8.685	0.013	1	
Onizah college of medicine	97 (94.2)	6 (5.8)			0.30	0.12 to 0.72
Sulliman AlRajhi College of medicine	103 (88.0)	14 (12.0)			0.66	0.35 to 1.24
Academic level						
1st year	102 (91.1)	10 (8.9)	20.407	<0.001	1	
2nd year	103 (92.0)	9 (8.0)			0.89	0.35 to 2.28
3rd year	100 (90.1)	11 (9.9)			1.12	0.46 to 2.76
4th year	71 (80.7)	17 (19.3)			2.44	1.06 to 5.65
5th year	65 (73.9)	23 (26.1)			3.61	1.61 to 8.08
GPA						
<4	160 (83.8)	31 (16.2)	1.379	0.240	1	
≥4	260 (87.5)	37 (12.5)			0.73	0.44 to 1.23

BMI, eating habits, hours of sleep, smoking status and participating in regular exercise did not impact on risk of IBS (Table 3).

Having food allergies was not associated with odds of IBS. However, a family or personal history, or an episode of travellers' diarrhoea were all associated with an increase in the odds of IBS being reported (Table 4).

Depression level was significantly associated with IBS, with IBS most common in those with depression ($p=0.042$) (Table 5). However there was no association with anxiety level.

Stepwise logistic regression was used to identify the characteristics that were independently associated with IBS

with the results presented in Table 6. Chronic health problems, more advanced academic level and personal history of IBS were all significant predictors for IBS. Respondents with chronic health conditions were 3.5 times more likely to have IBS than those without, while those with a personal history of IBS were over 6 times more likely to currently have IBS.

Next the characteristics of respondents with IBS were summarised by type of IBS. Due to low numbers, analysis compared IBS-M to all others. Across all characteristics recorded, only BMI category varied significantly between the two groups with IBS-M tending to have lower BMIs than those with other subtypes (Table 7).

Table 3: Lifestyle characteristics and odds of IBS

	<i>Non IBS</i>	<i>IBS</i>	<i>X²</i>	<i>p-value</i>	<i>Odds ratio</i>	<i>95% CI</i>
Food allergies						
<i>No</i>	389 (68.4)	61 (13.6)	0.065	0.798	1	
<i>Yes</i>	52 (85.2)	9 (14.8)			1.10	0.52 to 2.35
Personal history of IBS						
<i>No</i>	411 (89.5)	48 (10.5)	41.396	<0.001	1	
<i>Yes</i>	29 (56.9)	22 (43.1)			6.50	3.46 to 12.19
Family history of IBS						
<i>No</i>	341 (89.7)	39 (10.3)	15.696	<0.001	1	
<i>Yes</i>	97 (75.8)	31 (24.2)			2.79	1.66 to 4.71
Chronic health problems						
<i>No</i>	402 (88.9)	50 (11.1)	23.021	<0.001	1	
<i>Yes</i>	39 (66.1)	20 (33.9)			4.12	2.23 to 7.62
Travelers diarrhea						
<i>No</i>	410 (87.6)	58 (12.4)	7.290	0.007	1	
<i>Yes</i>	25 (71.4)	10 (28.6)			2.83	1.29 to 6.19

Table 4: Medical history and odds of IBS MW=Mann whitney

	<i>Non IBS</i>	<i>IBS</i>	<i>X²</i>	<i>p-value</i>	<i>Odds ratio</i>	<i>95% CI</i>
BMI, median	24.2	25.1	MW	0.070	1.04	0.99 - 1.09
BMI category						
<i>Underweight</i>	30(88.2)	4 (11.8)	4.646	0.326	1	
<i>Normal</i>	211 (87.9)	29 (12.1)			1.03	0.34 - 3.14
<i>Overweight</i>	112 (84.8)	20 (15.2)			1.34	0.43 - 4.22
<i>Obese</i>	42 (85.7)	7 (14.3)			1.25	0.34 - 4.67
<i>Morbidly obese</i>	19 (73.1)	7 (25.9)			2.76	0.71 - 10.73
Common food source						
<i>Home</i>	257 (85.7)	43 (14.3)	0.227	0.634	1	
<i>Restaurant</i>	1832 (87)	27 (12.9)			0.88	0.53 - 1.48
Fast food consumption frequency						
<i>Never</i>	20 (76.9)	6 (23.1)	2.342	0.505	1	
<i>1-3 times per week</i>	265 (84.2)	39 (12.8)			0.49	0.19 - 1.30
<i>4-6 times per week</i>	93 (86.9)	14 (13.1)			0.50	0.17 - 1.47
<i>Daily</i>	60 (84.5)	11 (15.5)			0.61	0.20 - 1.67
Daily sleeping hours						
<i>Less than 8 hours</i>	297 (85.6)	50 (14.4)	0.365	0.546	1	
<i>8 hours or more</i>	141 (87.6)	20 (12.4)			0.84	0.48 - 1.47
Smoking status						
<i>Currently a smoked</i>	17 (73.9)	6 (26.1)	3.132	0.079	1	
<i>previous smoker</i>	14(87.5)	2 (12.5)			0.41	0.07 - 2.33
<i>Never smoked</i>	410 (86.9)	62 (13.1)			0.43	0.16 - 1.13
Regular exercise						
<i>No</i>	328 (86.1)	53 (13.9)	0.044	0.834	1	

Table 5: Anxiety, depression and odds of IBS

	<i>Non IBS</i>	<i>IBS</i>	<i>X²</i>	<i>p-value</i>	<i>Odds ratio</i>	<i>95% CI</i>
Depression level						
<i>Normal</i>	238 (84.7)	43 (15.3)	6.344	0.042	1	
<i>Borderline</i>	107 (92.2)	9 (7.8)			0.47	0.22 to 0.99
<i>Morbid</i>	55 (79.7)	14 (20.3)			1.41	0.72 to 2.76
Anxiety level						
<i>Normal</i>	188 (88.7)	24 (11.3)	2.553	0.279	1	
<i>Borderline</i>	116 (85.3)	20 (14.7)			1.35	0.71 to 2.55
<i>Morbid</i>	99 (82.5)	21 (17.5)			1.66	0.88 to 3.13

Table 6: Characteristics identified as independent predictors of IBS using stepwise logistic regression

	<i>Odds ratio</i>	<i>95% CI</i>	<i>p-value</i>
Chronic health problems			
<i>No</i>	1		0.001
<i>Yes</i>	3.58	1.72 to 7.42	
Academic level			
<i>1st year</i>	1		0.011
<i>2nd year</i>	0.63	0.22 to 1.81	
<i>3rd year</i>	0.75	0.27 to 2.10	
<i>4th year</i>	1.63	0.65 to 4.11	
<i>5th year</i>	2.87	1.16 to 7.06	
Personal history of IBS			
<i>No</i>	1		<0.001
<i>Yes</i>	6.15	2.83 to 13.38	

Table 7: Demographic characteristics and type of IBS

FE=Fisher's exact test, MW=Mann whitney

	<i>IBS-M</i>	<i>Other</i>	<i>X²</i>	<i>p-value</i>	<i>Odds ratio</i>	<i>95% CI</i>
Student gender						
<i>Male</i>	28 (62.2)	19 (76.0)	1.383	0.240	1	
<i>Female</i>	17 (37.8)	6 (24.0)			1.92	0.64 - 5.76
Student age	22 (21 to 23)	23 (21 to 24)	MW	0.202	0.81	0.61 - 1.09
Marital Status						
<i>Single</i>	42 (93.3)	24 (96.0)	FE	1.000	1	
<i>Married</i>	3 (6.7)	1 (4.0)			1.17	0.17 - 17.4
Living status						
<i>Alone</i>	5 (11.1)	5 (20.0)	FE	0.763	1	
<i>Family</i>	38 (84.4)	19 (76.0)			2.00	0.52 - 7.76
<i>Friends</i>	2 (4.4)	1 (4.0)			2.00	0.13 - 29.8
Current Parent status						
<i>Living Together</i>	37 (82.2)	24 (96.0)	FE	0.217	1	
<i>Divorced</i>	3 (6.7)	1 (4.0)			1.95	0.19 -19.8
<i>Dead "one or both"</i>	5 (11.1)	0			na	

4. Discussion

Irritable Bowel Syndrome is the commonest chronic disorder of the alimentary tract 34,35. Its international prevalence is estimated to be 11.2% 36, and is impacted by various genetic, dietary and social factors 37. Several different studies investigated its prevalence and showed a wide range of variability within each geographical region. For instance, IBS prevalence in North America approaches 21.0%, however; in South Asia, it is 7.0% 36. Furthermore, Kim & Ban, 2005 stated that Koreans have less IBS prevalence rate as compared to that of the other western countries 24. The current investigation shows that the prevalence of IBS among medical students is 13.7%. On the contrary, two different local studies conducted in King Abdulaziz 15 and King Satam Bin Abdulaziz 14 Universities about the prevalence of IBS among medical students reported higher rates; (31.8%)

and (21%), respectively. Naeem et al. 2012 27 reported a closely similar prevalence (28.3%) among medical students in Pakistan. However, the prevalence reported in our study was close to that reported by Miwa Hiroto 2008 2 which was of 13.1%, and exactly similar to that reported by Mansour-Ghanaei, Fariborz, et al.2009 26. This inconsistency in the results might be attributed to different factors limiting the estimation of the actual number of students having IBS, including the sample size and response rate.

Several studies reported findings concerning frequency of IBS among non-medical students. Dong et al.2010 1 stated that the prevalence of IBS based on Rome III criteria is 7.85% among university and college students in China. In Lebanon, Costanian, Tamim, & Assaad, 2015 29 conducted a cross-sectional study among students of five different local universities, and concluded that 20% of University students

suffer from IBS. Nevertheless, results were more supportive of the hypothesis that medical students are more likely to be diagnosed with IBS compared to other students. Similarly, Okami et al., 2011 28 concluded that IBS prevalence rate was higher in the nursing and medical students.

Regarding IBS subtypes, the present study reported IBS-M to be the commonest amongst all the other subtypes constituting 64.3% followed by IBS-D (18.6%). Yang Liu et. al. 2014 19 described a similar finding in his study among medical students in Beijing, China, with IBS-M constituting 43.9% of those who were diagnosed with IBS, and IBS-D being reported by 31.0%.

Many studies reported that females had a higher risk of IBS than males 15,25,19,26,27,28,20,21,22. Liu et al. 19 showed that female students were twice more likely to suffer from IBS than males. Ibrahim et al.2013 15 reported that the first predictor of IBS was the female gender. However, our study showed no statistically significant relation between IBS and gender.

Ibrahim et al.2013 15 reported that students living in dormitories had a higher prevalence than students living with their families. Similarly, a study conducted by Costanian et al. 29 revealed that students living in private dormitories were three times more likely to suffer from IBS. Living situation was also significant in our study, with the odds of IBS being highest among those who live alone ($p=0.005$).

The current work illustrates that as the academic level increases, the rate of having IBS increases proportionately. Ibrahim et al.2013 15 described similar findings.

Basandra et al.3 reported that IBS was significantly associated with inadequate practicing of physical activities by Indian medical students. Costanian et al.2015 6 found that students who reported regular practicing of physical exercises had a significantly lower prevalence of IBS than others. The protective effect of physical activity was also reported by other studies 2,9. On the other hand, our study showed no protective effect of physical activity on the prevalence rate of IBS. Similarly, BMI was reported to be statistically significant by Ibrahim et al. 15 in contrast to the finding reported by our study.

Basandra et al. 25 found that consumption of fatty foods was significantly correlated with a higher prevalence of IBS. However, the current study illustrated that prevalence rate of IBS among medical students in Qassim was not impacted by eating habits.

In the present study, having food allergies was not associated with odds of IBS. On the other hand, Ibrahim et al.2013 15 reported that IBS was more frequent among those who had food hypersensitivity (64%) in comparison with those without food hypersensitivity (39.4%). Similar results were reported by Costanian et al.2015 29 .

Although our study showed no association between sleeping hours and prevalence of IBS, Ibrahim et al study 15 showed that students who slept fewer hours (<8 h/day) had a higher

prevalence of IBS than others . Similarly, Liu et al.19 reported an association between sleep disturbances and IBS; participants with IBS had a significantly higher Pittsburgh Sleep Quality Index (PSQI) score than others.

A study conducted among medical students revealed a significant association between IBS and cigarette smoking 25. However, another study which support our study did not show such an association 15.

In regards to family and personal history of IBS, we have found that a family or personal history were all associated with an increase in the odds of IBS. Previously it was reported that there is a familial role of IBS among the general population 30,31. A family-based case-control study in the USA confirmed the familial clustering of IBS cases and reported that IBS family history is a recognized predictor of it 30. Similarly, another familial aggregation of IBS cases was observed in other Western countries 31. It was found that there is an increased IBS risk among the first, second, and third-degree relatives from a Swedish population. Genetic factors may also contribute to the pathophysiology, which indicates a genetic component of the familial clustering of IBS 32. These studies correlate with the results obtained among medical students in our study.

Concerning chronic health problems, the present study revealed that having chronic health problems was a significant predictor of IBS. On the other hand, Ibrahim et al. 15 reported that there was no statistically significant difference between the presence of other chronic diseases and IBS ($p>0.05$).

This study showed a significant impact of depression ($p=0.042$) on the prevalence of IBS. Students with morbid level of depression had higher prevalence (20.3%) of IBS compared to those with borderline depression (7.8%). Ibrahim et al. 2013 15 reported that (41.9%) of medical students with IBS were diagnosed as having morbid level of depression compared to normal students (31.5%) in Jeddah. According E. Okeke et al. 23 depression is one of the leading causes of IBS among Nigerian medical students.

Regarding anxiety, the present study showed that IBS prevalence was higher in students with morbid levels of anxiety (17.5) compared to those with borderline anxiety (14.7). However, there was no statistically significant difference. Out of 360 medical students included in study done in Karachi, Pakistan for IBS, anxiety was encountered among 55.8% of the students 27. Sugaya et al. 2008 38 concluded that individuals who complain of IBS in Japan had higher scores on the HADS compared to the control group 6. It has been shown that although the symptoms of IBS influence anxiety and depression, psychological factors themselves affect the motor abdominal functions, sensory threshold and stress reactivity of the intestine 39.

5. Limitations

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This study covers only medical students in the region of Qassim, Saudi Arabia; more studies are needed to cover more medical students all over the kingdom, since many factors might differ from a region to another. The response rate from the females' section wasn't satisfactory conferring the sample size less likely to be generalized for this group of students.

6. Strengths

To the best of our knowledge, this is the first study to assess and cast a light on the status of IBS among medical students in Qassim, Saudi Arabia. This signifies the uniqueness of this paper. Furthermore, this work has covered both; private and public colleges of medicine in the region, revealing the wide range of social as well as economic factors among medical students in the region. Red-flags questionnaire has been added as a tool of evaluation, adding to the diagnostic accuracy.

7. Conclusion

The prevalence of IBS is 13,7% among medical students in Qassim region. Depression significantly correlate with a higher rate of IBS prevalence. However there was no association with anxiety level. age, living situation, advanced academic years, family or personal history, or an episode of travellers' diarrhoea were the main predictors of IBS. We recommend offering psychological and emotional support as well as stress management courses in order to deal with stress faced by medical students during their academic education.

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