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The prevalence and risk factors of irritable bowel syndrome among medical students and interns: results of a national survey in Saudi Arabia

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Abstract

Background & aim: University students worldwide are found to make up a considerable portion of the IBS affected population. There is a paucity of data from Saudi Arabia regarding prevalence of IBS among medical students and interns.

Material & methods: We conducted a cross sectional study to estimate the number of medical students and interns from different cities in Saudi Arabia who have irritable bowel syndrome and described the potential risk factors. Data was collected using a designed questionnaire while weight and height were measured to calculate the Body mass index (BMI). Diagnosis of IBS was made according to ROME IV criteria.

Results: A total of 856 medical students and interns from different cities in Saudi Arabia took part in this national survey and were included in the statistical analysis. Prevalence of IBS in the studied sample was estimated to be 17.5% (95% CI; 15.0% - 20.1%). It was revealed that stress (p=0.027), NSAIDs usage (p=0.002), alcohol consumption (p=0.049) and family history of IBS were significantly associated with a higher risk of developing IBS (p<0.001). History of appendectomy in the past, antibiotic usage were found to have no significant association with IBS.

Conclusion: The current study revealed that a considerable proportion of medical students & interns in Saudi Arabia suffer from IBS. A higher prevalence of IBS was observed among medical students who were under constant stress, consumed alcohol or used NSAIDs frequently and among those who had family history of IBS.

Keywords: irritable bowel syndrome, NSAIDs, stress, abdominal pain

1. Introduction

Irritable bowel syndrome (IBS) is a functional disorder of the gastrointestinal tract characterized by abdominal pain and altered bowel habit in the absence of specific organic causes [1]. Due to its effect on the patients' health-related quality of life and social functioning, it poses a psychological, economical and social burden [2]. In a study by Drossman *et al*. IBS was estimated to be associated with tripling of missed work-days and doubling of illness-related costs [3]. The overall prevalence of IBS is 10%-20% of the general population [4]. University students worldwide have been found to compose a considerable proportion of the IBS affected population [5]. This is especially true for medical students since they remain under constant psychological stress and often lead a difficult lifestyle [6].

Although the pathological cause of IBS is indistinct, there are many factors associated with the increased risk of IBS. These include female gender, family history of IBS, psychiatric stress, anxiety, depression, dietary factors, and sleep disorders [7] All of these factors are a part of the unfavorable lifestyle of medical students and junior doctors making this community especially vulnerable to IBS [8].

According to the Rome IV criteria, the diagnostic criteria for IBS include recurrent abdominal pain (on average at least 1 day/ week in the last 3 months) that is associated with two or more of the following criteria; relation to defecation, association with a change in the frequency of stools and/ or association with a change in the form (appearance) of stools. The symptom onset should be at least 6 months before the date of diagnosis [9]. Symptoms of IBS also include diarrhea, constipation, bloating, and feeling of incomplete evacuation of stools [10].

Early diagnosis can make management easier. And with alleviating the painful symptoms of the syndrome, the economic, social and psychological cost of the disorder will decrease which positively affects the health related quality of life [11].

We aimed to find the prevalence of IBS and describe the associated risk factors in the population of medical students and interns across various cities of Saudi Arabia. Early detection of Irritable bowel syndrome among medical students and interns will help in health care improvement and improvement in the performance of medical fraternity.

2. Material and methods

This cross-sectional study was designed to assess the prevalence and describe the risk factors of IBS among medical student and interns from different cities in the kingdom of Saudi Arabia. Data was collected using a designed questionnaire based on ROME IV criteria in addition to weight and height measurement for Body mass index (BMI) calculation. The questionnaire included questions about; socio-demographic data (age, gender, study years, GPA, marital status, hometown region, living in high altitude,

and family income), physical examination (weight, height), personal and dietary habits (smoking, alcohol consumption, stress in addition to dietary intake of sugar, fruits, vegetables, protein and spicy foods), medical history (family history of IBS, appendectomy or using medications like NSAIDs, antibiotics and oral contraceptive pills). We also included questions about the symptoms that may be associated with IBS like abdominal pain (location, frequency, and association with defecation), changes in appetite, heartburn, vomiting blood or bloody stools.

Statistical analysis

Data were statistically described in terms of frequencies (number of cases) and valid percentages for categorical variables. Mean, standard deviations, minimum and maximum were used to describe numerical variable. Comparison of categorical variables between the subgroups (cross-tabulation) was done using Chi-square/ Fisher exact test. P values less than 0.05 were considered statistically significant. All statistical calculations were done using computer program IBM SPSS (Statistical Package for the Social Science; IBM Corp, Armonk, NY, USA) release 21 for Microsoft Windows. Institutional research ethics board approval was acquired prior to conducting any study procedure.

3. Results

There were 856 students and interns involved in this study from different cities in Saudi Arabia.

Patients' characteristics

The mean± SD age of the population enrolled in the study was 23.3± 1.53 years, with the eldest being 30 and the youngest being 19 years old.

The mean± SD height was 165.27± 9.19 cm while the mean± SD weight was 68.38± 19.27 kg. The mean± SD BMI value was 24.8± 5.9 kg/m^2. More details are in table (1).

Table 1: Patient Characteristics (N=856)

	Age (Years)	Weight (kg)	Height (cm)	BMI (kg/m2)
Mean	23.3	68.38	165.27	24.8
Std. Deviation	1.53	19.27	9.19	5.9
Minimum	19.0	33.0	135.0	13.9
Maximum	30.0	155.0	193.0	62.4

The students and interns were categorized according to their BMI. Almost one half (50.1%) were considered having normal weight, 16% and 24.4% were considered obese and overweight respectively, while 9.5% were under weight. Data is displayed in figure (1).

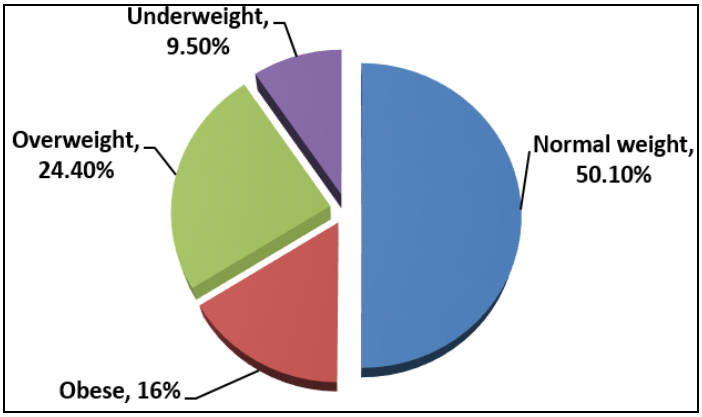

Fig 1: BMI Categorization (N=856)

Male participants made up 46.3% of the population included in the study while 53.7% were females.

Data about the marital status of the participants was collected and it was found that 7.6% of the participants were married while 92.4% were unmarried.

Out of the 856 participants, 22.9% were fourth year students, 22.1% were fifth year students, 33.1% sixth year students while 22% were interns.

As for data about their hometown, 8.9% were from the eastern region, 20% were from the middle region, 8.8% were from the northern region, 15.9% were from the southern region, and 46.5% were from the western region. Around 72.5% of the participants were from areas of normal altitude and 27.5% were from high altitude cities. The participants were asked if they were subject to stress lately and the vast majority (94.2%) said yes.

The participants were asked about their dietary intake and personal habits where 15.9% said that they are smokers, 6.4% said that they consume alcohol, 72.8% eat spicy food, 85.5% eat vegetables while 79.1% eat high-protein food and 75.1% eat high-sugar food. The participants were asked about their medication usage and 42.2% claimed that they used NSAIDs recently, 15.2% used antibiotics, while 2.9% were on contraceptive pills. As for medical history, 3.5% underwent an appendectomy and 50.5% have family history of the disease.

Prevalence and risk factors of IBS among the medical students and interns

According to collected data and guided by ROME IV criteria, the prevalence of IBS among the study population was 17.5% (95% CI; 15.0% - 20.1%).There were also several risk factors tested for association with IBS such as gender, hometown region, BMI grade, smoking, alcohol, stress, dietary habits, as well as medications use and medical history. Detailed results are provided in table 2.

Gender was found to have no significant effect on the prevalence of IBS as the prevalence among females (19.6%) didn't differ significantly (p=0.090) from that among males.

No significant difference (p=0.159) was found between the prevalence of IBS in the east region (14.5%), middle region (14.0%), north region (20.0%), south region (13.2%) and the west region (20.6%) of Saudi Arabia.

The same as age and gender, BMI didn't show any significant effect on the prevalence of IBS (p=0.870).

Again, the prevalence of IBS among smokers (20.6%) didn't differ significantly (p=0.305) from that among non-smokers (16.9%).

On the other hand, the prevalence among participants who consumed alcohol (27.3%) was significantly higher (p=0.049) than that among participants who did not consume it (16.9%).

On the other hand, it was found that IBS was significantly (p=0.027) more prevalent in participants who are subject to stressful situations (18.2%) compared to participants who are not (6.0%).

There was no significant correlation between IBS and any of the examined dietary habits including eating spicy food (p=0.114), eating vegetables (p=0.562), eating high-protein food (p=0.740) or eating high-sugar food (p=0.728).

A statistically significant difference (p=0.002) was found between the prevalence of IBS among participants who use NSAIDs (22.2%) compared to those who do not (14.1%). On the other hand, antibiotics use and oral contraceptive pills use were not significantly related to IBS development (p=0.119 and p=0.839 respectively).

IBS prevalence among participant who underwent appendectomy (26.7%) didn't differ significantly (p=0.180) from that among participants who did not (17.2%).

The prevalence of IBS among participants who have family history of the disease (23.8%) was significantly higher (p<0.001) than that among participant who don't have family history of the disease (11.1%).

Table 2: Risk factors of IBS (N=856)

Participants with IBS			P value*
Gender	Male	15.2%	0.090
	Female	19.6%	
Region	East region	14.5%	0.159
	Middle region	14.0%	
	North region	20.0%	
	South region	13.2%	
	West region	20.6%	
BMI grade	Underweight	16.6%	0.870
	Normal weight	17.5%	
	Overweight	19.1%	
	Obese	18.5%	
Smoking	Yes	20.6%	0.305
	No	16.9%	
Alcohol	Yes	27.3%	0.049
	No	16.9%	
Stress	Yes	18.2%	0.027
	No	6.0%	
Eating spicy food	Yes	18.8%	0.114
	No	14.2%	
Vegetables and fruits	Yes	17.2%	0.562
	No	19.4%	
High-protein food	Yes	17.3%	0.718
	No	18.4%	
High-sugar food	Yes	17.3%	0.728
	No	18.3%	
NSAIDs	Yes	22.2%	0.002
	No	14.1%	
Antibiotics	Yes	22.3%	0.119
	No	16.7%	
Oral contraceptive pills	Yes	16.0	0.839
	No	17.6	
Appendectomy	Yes	26.7%	0.180
	No	17.2%	
Family history of IBS	Yes	23.8%	<0.001
	No	11.1%	

*Chi square test was used to compare between the prevalence of IBS in the different subgroups

4. Discussion

IBS is a functional gastrointestinal disorder that challenges medical students worldwide. It is mainly due to the stressful lifestyle and unfavorable habits that lead to physical and psychological stress in this particular community (6,8) This study found IBS prevalence of 17.5% (95% CI; 15.0% - 20.1%) among medical students and interns across Saudi Arabia while previous data from Jeddah showed a prevalence

of 31.8% among medical students and interns [12]. This gives a range of 17.5% to 31.8% prevalence of IBS among medical students and interns which is higher than the trend seen in general population (10% to 23%) around the globe [13]. The medical students invariably remain under constant stress; the duration it takes to complete their studies, numerous exams, difficult shifts, and the responsibility of managing patients as an intern may be additive factors to the stress levels among interns, leading to IBS in susceptible individuals. Chu *et al*. conducted a study among medical, science, and engineering students in China. They reported that medical students had a much higher risk of functional bowel disorders (FBD) than science and engineering students [14]. It was also revealed in this study that stress was significantly associated with IBS (p=0.027). The exact mechanism how stress leads to IBS or its relapsing symptoms remains elusive. However, studies have shown that the acute psychological stress increases small intestinal permeability in humans there is a possible involvement of mast cells explaining a complex interplay between central nervous system and GI function in humans [15].

While we didn't observe any significant association between IBS and BMI a study by Farzaneh *et al*. has observed that lower BMI and being unemployed were the most important factors associated with IBS, particularly in females [16].

This study demonstrated a significant association between alcohol consumption and IBS (p=0.049). In consistency with the findings of a study conducted in Taiwan in 2015 [17]. While none of our study participants was found to be consuming alcohol in large amounts but a study from Riyadh Saudi Arabia found that alcohol was the most prevalent substance used by youth and there is an increased trend in alcohol consumption among youth [18]. A sinister relationship has been found to exist between alcoholism and IBS. Even people with family history of alcoholism or substance abuse are known to have high prevalence of IBS [19] All of our female study participants denied alcohol intake. However, it has been observed that the associations between alcohol intake and GI symptoms were stronger for women with IBS-diarrhea than for IBS-constipation or IBS-mixed. Further a relationship with IBS was identified when interactions with somatization and gender were appropriately considered. Whether these associations are due to the effects of alcohol on the gut, or a common central mechanism remains to be determined [20].

There was a difference in the prevalence of IBS among females (19.6%) compared to IBS among males (15.2%) but it didn't reach statistically significant levels (p=0.090) possibly due to lesser number of female participants compared to males in this study. Other studies have shown consistent results, with higher predisposition of females to IBS [13, 21].

The complexity of food-symptom interactions in IBS is being revealed in recent and ongoing research. Studies have revealed the variable effects of fibre in IBS and the IBS individuals are susceptible to the ingestion of poorly digested and absorbed carbohydrates. Based on this concept there is a widespread adoption of the low-fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs) diet among IBS patients [22]. Food is a common precipitant of symptoms in IBS. In this study it was observed that eating spicy foods was not correlated with IBS or its symptoms. In contrast, a study in Lebanon found that spices were triggers to IBS symptoms [23]. This contradiction may be due to the small proportion of our participants who don't eat spicy food (27.2%).

It's believed that family history of IBS is the main determinant of experiencing abdominal complaints [24]. This was also revealed in our study as the prevalence of IBS among participants who have family history of the disease was significantly higher (p<0.001) than that among participant who don't have family history of the disease.

This study revealed that NSAIDs usage were significantly associated with IBS (p=0.002) as shown in Table 2. Keszthelyi *et al*. compared 287 cases of IBS patients with age and gender matched controls and observed that NSAIDs were more frequently used in IBS patients compared to controls. NSAIDs potentially alter intestinal homeostasis in IBS patients compared to controls .Nevertheless authors in the aforementioned study concluded that it may be difficult to elucidate whether this association was of etiological nature [25].

This study didn't demonstrate any significant association between antibiotic usage, oral contraceptive pills among females and history of appendectomy in the past. IBS patients are prone to negative appendectomies due to their lower pain threshold. In a study by Lu CL *et al*. authors concluded that both patient (IBS, anxiety, atypical presentation) and physician (low CT scan usage) factors are the independent determinants predicting negative appendectomy .Authors in their study concluded that the surgeons should be cautious before operating on or referring patients with IBS for appendectomy. They further concluded that the CT scan should be considered in patients with suspected appendicitis, particularly in those with IBS and atypical clinical presentations.

5. Conclusion

It can be concluded that prevalence of IBS among medical students and interns in Saudi Arabia are marginally higher than the global rates of the disease in the general population. Our results support the evidence that stress, using NSAIDs and family history of IBS are significantly associated with higher risk of developing IBS. It's important to give special considerations to IBS in terms of conducting further prospective studies to determine the potential modifiable risk factors. This will allow better management and higher quality of life for IBS medical graduates and interns who are prone to develop the disease.

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