Irritable Bowel Syndrome amongst Medical Students in Oman - A cross sectional study

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Objectives: Irritable bowel syndrome (IBS) is a globally common functional gastrointestinal disorder which mainly affects people with high levels of stress. Given that medical students are presumably exposed to higher levels of stress in comparison to others, this study aims to assess the prevalence of IBS in Medical students as well as possible associated risk factors. **Method:** A cross-sectional study was carried out at the National University of Technology and Health Sciences, College of Medicine, Oman during the period between 1 June and 2 July 2017. A comprehensive self-administered questionnaire was used to cover the following aspects : Age and gender, grade, possible triggers or risk factors, Rome IV Criteria, generalised anxiety score and family history of IBS. **Results:** A total of 464 students participated in the study, from which 38.9% (n=179) were detected to have IBS. The identified types of IBS include diarrhea (38.5%), mixed diarrhea and constipation (36.3%) and constipation (25.1%). The prevalence of IBS was higher amongst female students (41.3%). Year 2 students showed the highest prevalence ($X^2 = 35.4,\ P = 0.001$). Students with positive family history of IBS showed higher IBS prevalence rate ($X^2 = 5.73,\ P = 0.017$). The prevalence rate of IBS increased with increased anxiety levels and the difference was almost significant ($X^2 = 7.77,\ P = 0.051$). **Conclusion:** More than a third of medical students included in our study, have shown symptoms consistent with undiagnosed IBS. It seems that high level of stress (represented by subjective anxiety) might play an important role in such high prevalence. Implementing effective measures to decrease stress levels may be beneficial in dealing with this problem which subsequently reflects positively on students' quality of life and academic performance.

Advances in Knowledge

Irritable bowel syndrome is a common disorder worldwide and those with increased stress levels are more prone to it.

Since medical students are exposed to higher levels of stress compared with others, they are more likely to suffer from irritable bowel syndrome, especially amongst females.

Application to Patient Care

For the first time, the results of this study highlight the burden of irritable bowel syndrome on medical students in Oman. It also analyses relevant trigger g factors. Introducing appropriate actions to address this issue is likely to a have desirable effects on students' lives and teaching process.

Functional gastrointestinal disorders are common in clinical practice and the main disorder within this group is irritable bowel syndrome (IBS). Irritable bowel syndrome is clinically defined as a group of symptoms including abdominal pain and changes in the pattern of bowel movements without any evidence of underlying damage (Lin, 2017).

Around 15% of the general population worldwide has IBS symptoms. However, less than one fifth visit their doctor for medical advice. Five percent of patients attending general practitioner clinics actually have a clinical diagnosis of IBS, representing 20-50 % of referrals to gastroenterologists. Gender wise, according to the majority of literature irritable bowel syndrome affects female more than males. (Thompson et. al., 1999); (Heaton et. al., 2008); (Miwa, 2008); (Thabane et. al., 2007).

European countries show about a 20 % prevalence of this disorder . Recently, the morbidity of this disorder in Asian countries showed constant increase approaching that of Western countries (Gulewitsch et. al., 2013); (Naeem et.al., 2012); (Ibrahim et. al., 2013); (Jung et. al., 2011).

All age groups are affected, (Jones and Lydeard, 1992) however few clinical studies found that IBS is more common in people below the age of 25. (Fielding, 1977).

For the sake of clear and objective diagnosis, the International Working Group for IBS convened in Rome in 1987 and generated the Rome I criteria which was followed by further updates to Rome II and Rome III in subsequent years. Most recently Rome IV was established in May 2016 (Thompson, 2006).

The trigger(s) for IBS is not clear despite the fact that stress is identified in most cases (Jafri et. al., 2005). However, many people with tremendous levels of stress have no evidence of IBS as of yet. A number of studies reported that IBS is linked to increased emotional and psychological stress (Edward Group DC. 2015). Stress might stimulate colonic spasms as shown by one study in Malaysia (Tan et. al., 2003).

Due to immense mental and emotional challenges, medical students are thought to be more prone to IBS. This might be attributed to extensive study and exam load, increasing competition for jobs, as well as undesirable living and eating habits (Naeem et. al., 2012); (Ibrahim et. al., 2013); (Christy et. al., 2015); (Mariam et. al., 2015).

Assessing prevalence as well as possible triggers of IBS in medical students provides a clue towards measuring required support for affected students and subsequent improvement in their quality of life and learning abilities. Accordingly, this study aims to assess the prevalence of IBS in medical students as well as relevant stimulants.

Methodology

Study Setting and Ethical Approval

This is a cross-sectional study which was carried out in the National University of Sciences and Technology (NUST), College of Medicine and Health Sciences, Oman during the period between 1 June and 2 July 2017. This period has been selected as it is close to the end of the academic year which allows us to evaluate its particular effect on students of a specific grade. We approached students in each year individually in a designated hall and explained the nature of the study. Those who agreed to be involved gave a clear consent for participation. The Research and Ethical Committee of the National University of Science and Technology (NUST), College of Medicine and Health Sciences approved the study protocol prior to undertaking it.

Study Sampling and Data Collection

A total of 464 medical students were included in the study. The study population included second to seventh year medical students. We used comprehensive researcher generated questionnaires to be completed by participants, which included:
1. Personal data: Gender and age, family history of IBS as well as smoking and alcohol consumption.
2. Triggers: Grade, approximate time (in hours) spent in theoretical versus practical teaching, sleeping hours, studying hours and food habits.
3. Rome IV Criteria: Depending on these criteria, we identified possible cases of IBS, which

is defined as recurrent abdominal pain, on average, at least 1 day per week during the last 3 months, associated with two or more of the following:

a) Related to defecation

b) Associated with a change in frequency of stool

c) Associated with a change in form (appearance) of stool

d) Criteria fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis.

Generalised Anxiety Score: We used this score to evaluate the possibility of associated anxiety. According to this method of scoring, students fell in one of the following categories: scores of less than 6 mean no anxiety, scores within 6-8 means indicate low level of anxiety, scores within 8-10 mean moderate levels of anxiety and more than 10 indicates high levels of anxiety.

Data Analysis: Statistical analysis was completed by using SPSS version 16.0. Mean and standard deviations were calculated for continuous and proportions for categorical variables. Chi square test was applied to derive p-values in order to identify the significance of results.

Results

A total of 464 students participated in the study, out of which 38.9% (n=179) were detected to have IBS. Table I presents the types differences of IBS identified IBS students (n=179) in the current study. Identified types of IBS consist of diarrhea (38.5%), mixed diarrhea and constipation (36.3%) and constipation (25.1%).

Table 1: Types of IBS in medical students in Oman (N = 179)

IBS Type		Frequency	Percentage
	Diarrhea	69	38.5
	Mixed	65	36.3
	Constipation	45	25.1
	Total	**179**	**100.0**

The prevalence of IBS according to student characteristics is shown in Table II. The prevalence of IBS was higher amongst female students (41.3%) compared to male students (38.3%), however, the difference was not significant ($X^2 = 0.154, \ p = 0.694$). There was a significant

difference in the prevalence of IBS by grade ($X^2 = 35.4, \ p = 0.001$), as fourth grade students showed the highest prevalence of IBS with 65.8% whereas the lowest prevalence was reported among second grade students (24.6%).
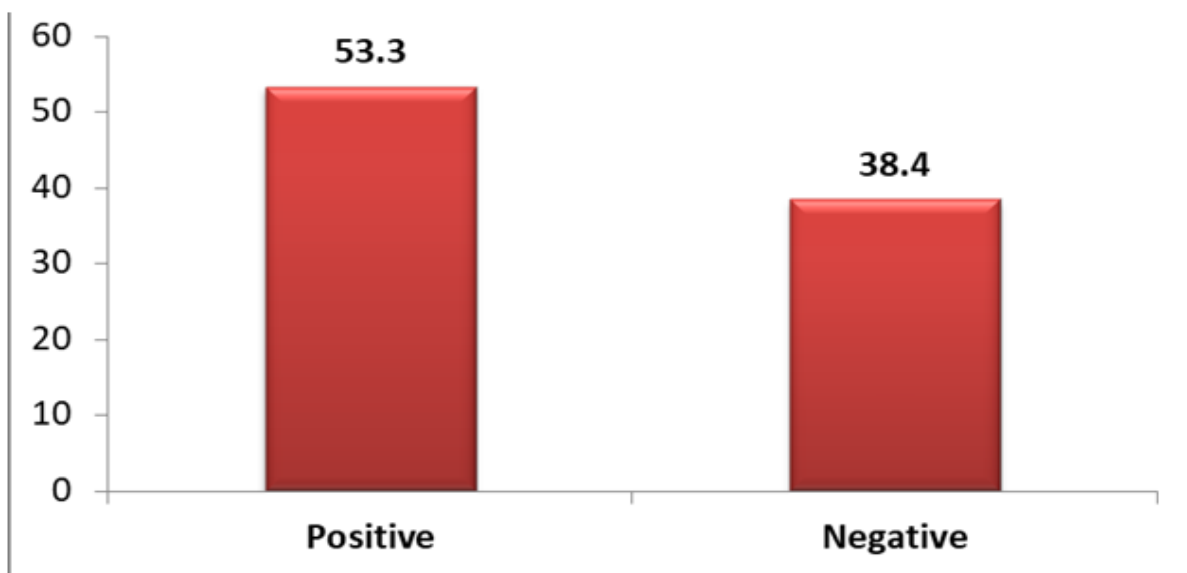
Table 2: Prevalence of IBS according to student characteristics

		IBS Status				Total	Chi-Square	
		Detected IBS		Non-Detected IBS			Test	P-value
		Freq.	%	Freq.	%			
Gender	Male	18	38.3	29	61.7	47	**0.154**	**0.694**
	Female	161	41.3	229	58.7	390		
	Total	**179**	**41.0**	**258**	**59.0**	**437**		
Year (Grade)	2	29	24.6	89	75.4	118	**35.4**	**0.001**
	3	17	30.4	39	69.6	56		
	4	48	65.8	25	34.2	73		
	5	22	44.0	28	56.0	50		
	6	30	45.5	36	54.5	66		
	7	33	44.6	41	55.4	74		
	Total	**179**	**41.0**	**258**	**59.0**	**437**		
Study time	1-2 hours	35	42.2	48	57.8	83	**0.89**	**0.828**
	3-4 hours	66	41.3	94	58.8	160		
	5-6 hours	40	37.4	67	62.6	107		
	More than 6 hours	38	43.7	49	56.3	87		
	Total	**179**	**41.0**	**258**	**59.0**	**437**		
Sleep time	1-2 hours	3	50.0	3	50.0	6	**0.827**	**0.935**
	3-4 hours	29	41.4	41	58.6	70		
	5-6 hours	85	39.7	129	60.3	214		
	7-8 hours	55	41.4	78	58.6	133		
	More than 8 hours	7	50.0	7	50.0	14		
	Total	**179**	**41.0**	**258**	**59.0**	**437**		
Anxiety	None	20	29.0	49	71.0	69	**7.77**	**0.051**
	Mild	108	40.8	157	59.2	265		
	Moderate	36	47.4	40	52.6	76		
	Severe	15	55.6	12	44.4	27		
	Total	**179**	**41.0**	**258**	**59.0**	**437**		

Weekend improvement	Yes	157	41.2	224	58.8	381	**0.075**	**0.785**
	No	22	39.3	34	60.7	56		
	Total	**179**	**41.0**	**258**	**59.0**	**437**		
Family history	Yes	40	53.3	35	46.7	75	**5.73**	**0.017**
	No	139	38.4	223	61.6	362		
	Total	**179**	**41.0**	**258**	**59.0**	**437**		

Family history had a significant correlation with IBS ($X^2 = 5.73$, $p = 0.017$) as students with family history had a higher prevalence rate (53.3%) in comparison to those without it (38.4%) [Table II] and [Figure 1].

Figure 1. The bar graph represents the prevalence of IBS in medical students in relation to positive or negative family history of IBS.

The rate of prevalence of IBS increased with anxiety levels and the difference was almost significant ($X^2 = 7.77$, $p = 0.051$) [Table II] and [Figure 2].

Figure 2. A bar graph represents the prevalence of IBS in medical students according to associated anxiety level.
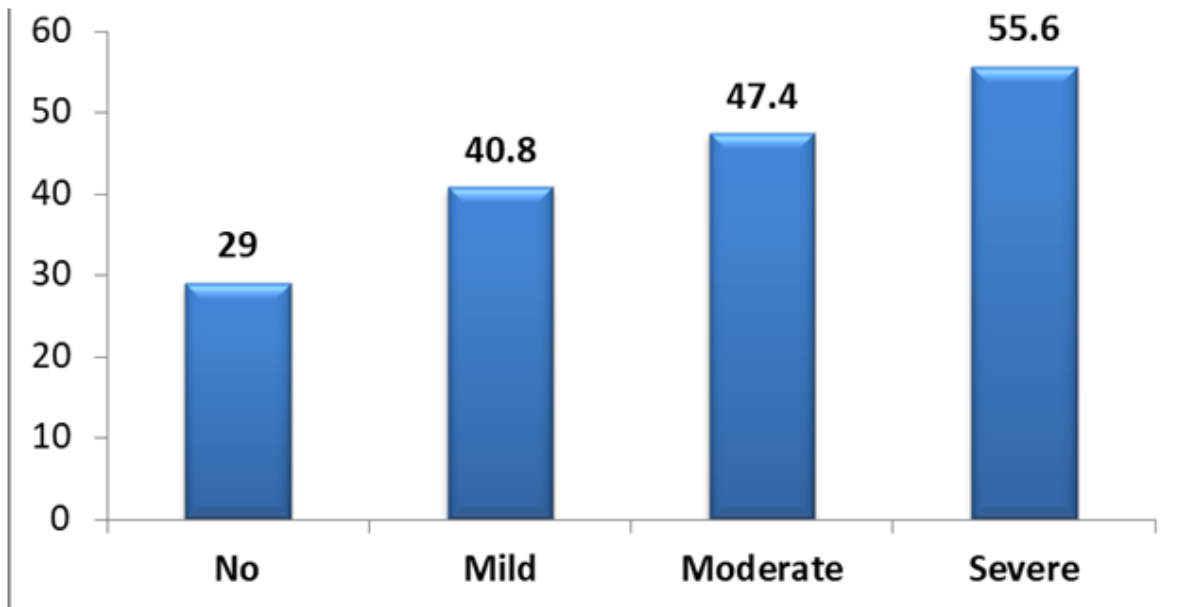
Other factors (sleeping hours, studying hours and improvement at weekend) did not show any significant variation between IBS and non-IBS students [Table II].

Discussion

Irritable bowel syndrome is a known functional gastrointestinal disorder with a variable rate of prevalence. The worldwide prevalence ranges between 5.7 % and 34%.(Shen et. al., 2009) As a result of the known relation between stress and the development of IBS,[7] we have selected medical students as a potential population experiencing high levels of stress and a probable higher prevalence rate of IBS.

We found that 38.9% (n=179) of medical students have undiagnosed IBS with an additional 5.8% (n=27) of students who were already known to have IBS. This prevalence rate of IBS amongst medical students is higher than those appearing in similar studies, such as Ibrahim NK et. al. (31.8%), (Ibrahim et. al., 2013) Naeem et. al., (28.3%) (Naeem et. al., 2012) and Yang Liu et. al. (33.3%)(Yang et. al., 2014).

As expected, such higher prevalence rate of IBS amongst medical students can be explained by exposure to high stress levels which represent a major predictor for IBS, (Naeem et. al., 2012) yet so far the mechanism of how stress leads to gastrointestinal symptoms has not been clarified . However, the tide pathophysiological relationship between the central nervous system and gastrointestinal system has been explained by some studies (Jafri et. al., 2005).

High stress levels amongst medical students might be attributed to long teaching hours, competition and the fact that most live away from family support. Mansour-Ghanaei et. al. found that Iranian students living at a distance from their families had significantly higher prevalence rates of IBS (Mansour-Ghanaei et. al., 2011). In addition, Pariat et. al. found that academic stressors (including family expectation, teachers' expectations, competition with other students and excessive course work or workload) all contributed towards students' stress level during academic years (Lakyntiew et. al., 2014).

In our study, the majority of newly diagnosed IBS students were females (89.9%) whereas males represented only 10.1%. This finding is consistent with the fact that IBS has a female predominance (Tan et. al., 2003), (Tzouvala, 2002) and (Lovell and Ford 2012). The cause for females having higher IBS prevalence remains uncertain. One probable explanation is hormonal changes. Fukudo et. al. maintain that the variation of hormone levels may play a role in female predominance (Fukudo, 2006).

Furthermore, the co-existence of IBS symptoms with the menstrual cycle was identified by the Triadafilopoulos G. et. al. , (Triadafilopoulos et. al., 1998) although Sun Young Lee et. al.'s study did not indicate such association (Sun-Young et. al., 2007)

We found that the highest IBS subtype was diarrhea predominant (38.5%); followed by a mixed subtype (36.3%) then IBS with constipation predominance (25.1%). However, according to Naeem et. al. and Yang Liu et. al. mixed IBS subtype constituted the highest rate (55%), (Naeem et. al., 2012), (Yang et. al., 2014) while Costanian et al.'s study reported constipation to be the predominant mode of presentation (36.8%) (Christy et. al., 2015). The variability in IBS presentation might be multifactorial in origin i.e. genetic and environmental.

In this study, positive family history of IBS has a significant association with undiagnosed IBS in medical students ($P = 0.017$) . This finding is not consistent with Costanian et. al.'s study, in which the majority of the students with IBS did not report any family history (Christy et. al., 2015). Again, this might be related to genetic as well as environmental influences.

The rate of prevalence of IBS increased with anxiety level and the difference was significant ($P = 0.051$). It is known that mental distress may be a predisposing factor to brain-gut axis dysfunction which in turn causes gut dysfunction through neural, neuro-immune and neuro-endocrine pathways (Choung et. al., 2009)/ Nicholl et. al. demonstrated a clear co-existence of anxiety disorders with IBS (Nicholl et. al., 2008). Similarly,Hazlett-Stevens et. al. linked worry and anxiety as important factors in the occurrence of IBS (Hazlett-Stevens et. al., 2003).

Year four students showed the highest prevalence of IBS in comparison to other grades which may be attributed to their initial exposure to clinical training as well as the relatively heavier

curriculum. On the other hand, we could not find any statistical differences regarding other variables including sleeping or studying hours or weekend improvements . These variables have been studied based on the assumption that they might have an impact on students' stress levels.

A reasonable sample size and high response rate to questionnaires represent the strength of this study, however there are certain limitations . Firstly, the result cannot be generalised as it represents a specific group of population (medical students). Secondly, exclusion of potential organic causes of IBS symptoms was not possible since the study is based on questionnaires.

Conclusion

More than one third of medical students included in our study, have shown symptoms consistent with undiagnosed IBS. It seems that high levels of stress (represented by subjective anxiety) may play an important role in the existence of such high prevalence. Implementing effective measures to decrease stress levels might be considered an effective way to deal with this problem which subsequently impacts   students' quality of life and academic performance.

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