Medical Science

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Prevalence of irritable bowel syndrome and its associated risk factors among medical students in Riyadh, Saudi Arabia: A cross sectional study

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ABSTRACT

Background and Objectives: Irritable bowel syndrome is associated with psychological disorders, including stress, anxiety, and depression which were reported to be high among medical students. This study investigates the prevalence of IBS and associated risk factors among medical students in Riyadh, Saudi Arabia. *Methodology:* A cross-sectional online survey study collected responses from medical students in Riyadh using a 24-items questionnaire to evaluate the prevalence of IBS and its associated risk factors among medical students. All statistical analyses were done using (IBM) SPSS version 19. *Results:* A total of 389 participants filled study questionnaire; female gender was significantly higher than males in the diagnosed IBS participants (p = 0.028). There was a notable difference between the number of participants with a physician IBS diagnosis and risk categories (p< 0.001). No significant correlation was observed in risk subgroups with sleeping duration (r = 0.095, p = 0.06) and coffee consumption (r = 0.063, p = 0.214). A significant difference was noted in the risk subgroups regarding having episodes of anxiety, stress, or depression (p< 0.001). Counting on self-reporting IBS diagnosis by a physician, prevalence is 12.6%, 95% CI (9.5 to 15.9). *Conclusions:* In Riyadh, Saudi Arabia, our study found that medical students dealing with anxiety and depression were at high risks of developing IBS. Thus, anti-stress measurements and early screening are highly needed. Moreover, implementation of proper awareness and preventive measures could positively impact with behavioral therapy on the quality of life of the students and to lessen disease burden.

Keywords: Irritable bowel syndrome, risk factors, medical students

1. INTRODUCTION

Irritable bowel syndrome (IBS) is a chronic disorder that affects the digestive system; thereby, it could be manifesting as recurrent episodes of abdominal discomfort or pain associated with alteration of bowel habits in the absence of organic disease (Longstreth et al., 2006). Around 10–15% of the population worldwide and 15.8% in Saudi Arabia suffer from IBS (Al Butaysh et al., 2020; Longstreth et al., 2006). Several morbidities could be co-present with IBS, such as chronic fatigue syndrome, chronic pelvic pain, somatization, depression, anxiety, or dyspepsia (Ford et al., 2010; Riedl et al., 2008). More evidences are discovered about the bidirectional communications of gut microbiota withgut–brain axis components such as GIT and CNS (Carabotti et al., 2015). Moreover, IBS has been considered a gut-brain interaction disorder involving multi-systems such as central nervous, endocrine, and gut microbiota (Carabotti et al., 2015). Thereby, IBS could be significantly triggered by several factors like psychological disorders, lifestyle habits, personal factors, and genetic factors (Mayer et al., 2015).

Medical students experience continuous challenges to master medical knowledge and skills they have to go through to become a proficient healthcare providers. These may, contribute negatively to their psychological well-being and anxiety levels. Several studies have discussed the prevalence rate of IBS among medical students and non-medical students. Local studies showed a high frequency in medical students thanin other colleges. For instance, a study done at Jouf University, Saudi Arabia, reported a significantly higher prevalence among medical students (29.28%) more than nonmedical students (16.4%) (Wani et al., 2020). Similarly to the study conducted at The King Faisal University, the overall prevalence among the medical students was 44.5% (Alsuwailm et al., 2017). Meanwhile, lower IBS prevalence were reported at The King Saud Bin Abdul-Aziz University, Riyadh with 21%, (Alaqeel et al., 2017) followed by The King Saud Bin Abdul-Aziz, Jeddah with 15.64% at, and Al-Qassim with 13.7%. In comparison to global studies, multiple countries showed a similar higher prevalence among medical students, such as 31.7% in Egypt (Elhosseiny et al., 2019) and 29.5% in China (Wang et al., 2016).

Several studies demonstrated a strong association between IBS and psychological disorders. It appears that stress and depression are more prevalent among medical students compared to the general population. Moreover, the global prevalence rate of anxiety among medical students was reported as 33.8% (Quek et al., 2019). In the Riyadh study, 50% of medical students had anxiety with higher percentages in the fifth clinical year and the internship year (Alaqeel et al., 2017). Also, demographic factors like gender, marital status, and living status had a discrepancy. According to Jouf University study, a significant association was present with these factors and the occurrence of IBS (Wani et al., 2020).

In this study, we aimed to explore the prevalence of IBS and associated risk factors among medical students in the largest city in Saudi Arabia. We also utilized a scoring system to subgroup the risk of IBS diagnosis (WGOPG, 2009).

2. METHODOLOGY

Study design and participants

A cross-sectional online survey study collected response data from Saudi medical students across the city of Riyadh upto October 2021. A newly developed questionnaire was used to assess the prevalence of IBS and its associated risk factors among medical students. The questionnaire was sent out using the online platform hosted by Survey Monkey Inc. (San Mateo, California, USA; www.surveymonkey.com), together with a cover letter attached to a consent form and an explanation of the project. The questionnaire contained no identifying information, and the participation was voluntary.

Before undertaking the investigation, ethical clearance was obtained and approved by the ethical research committee of the Institutional Review Board (IRB) of Imam Mohammed Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia, (HAPO-01-R-0011, Project No. 119-2021).

Study measures

A 24-item questionnaire was designed to ascertain both the prevalence and risk factors of IBS among medical students and was divided into four sections; in which the first was used to inquire about the demographics and certain characteristics of respondents. The second part was designed to identify the lifestyle and eating habits undertaken by respondents. The third part gauged the psychological well-being and sleeping habits of respondents. The final part utilized a questionnaire developed by the World Gastroenterology Organization (WGO) with the support of Danone to establish an IBS diagnosis (WGOPG). The scoring system of this IBS questionnaire is as follows: 25-30 score indicates that the respondent is likely to be suffering from IBS, while a score of 15-24, shows that the respondent may suffer from IBS, but other conditions are also possible, and a score below 15 means that the respondent symptoms are unlikely to be associated with IBS.

Survey Distribution

Distribution of the survey was made after generating a list containing either government or private medical colleges located in Riyadh, Saudi Arabia, using a multipronged approach. After that, the survey was sent out through official e-mail addresses of each university, and through contacting the students' club of each college or utilizing existing communication structures among medical students like social media groups. Before this, a pilot study of qualitative methodology was carried out on ten randomly selected medical students to validate the usability and clarity of the questionnaire. Of note, these students did not partake in the actual survey. Based on the analysis of the pilot study, the questionnaire was modified according to our research objectives.

Statistical analysis

Participants were sub-grouped according to the total score of the first 16 questions if more than >15: IBS diagnosis is not likely, 15 to 24: IBS is considered, and 25 to 30: IBS diagnosis is likely. All statistical analyses were performed using (IBM) SPSS version 19. Descriptive statistics using frequencies and percentages were used to summarize categorical variables in participants' characteristics and responses. The chi-square test and Fisher's exact test were used when appropriate to determine the association between variables. Crosstabs and Logistic regression models were also used to calculate odds ratios and 95% confidence intervals. All statistical tests were performed two-sided, and the statistical significance was considered when the p-value (p) was < 0.05.

3. RESULTS

Demographic data of respondents

A total of 389 participants responded to our structured questionnaire. The greatest proportions of participants were from the internship year (n=96, 24.7%) and third-year (n=76, 19.5%). Male and female gender were presented almost equally (49.6% males and 50.4% females). More than two-thirds of the sample (n=304, 78.1%) were in the age group between 20 to 24 years old, and 19% were between 25 and 30 years. BMI was normal in half of the sample, while overweight (25 to 29.9) in 25.2%, obesity >30 in 14.1%, and underweight in 8.5%. Of note, ten participants out of 49 diagnosed with IBS (20.41%) were obese. Almost 96.9% of participants were single, and 94.6% reported not having another job. Regarding the GPA, 47% of the responder had excellent grades (n=183) and 34.4% with very good (n=134); besides, almost half of the sample reported that they were "very satisfied" or "satisfied" with their current GPA (n= 98 and 125, respectively. A total of 334 responders (85.9%) reported that they do not smoke (Table 1).

Table 1 Relationship between IBS and demographic characteristics of respondents

Item	Total		Diagnosed (n=49)		Not diagnosed (n=340)		P value
	N	%	N	%	N	%	
Medical year							0.156
Preparatory year	14	3.6	0		14	4.12	
1st Year	42	10.8	5	10.20%	37	10.88%	
2nd Year	23	5.9	1	2.04%	22	6.47%	
3rd Year	76	19.5	12	24.49%	64	18.82%	
4th Year	69	17.7	8	16.33%	61	17.94%	
5th Year	69	17.7	5	10.20%	64	18.82%	
Internship Year	96	24.7	18	36.73%	78	22.94%	
Gender							0.025
Male	193	49.6	17	34.69%	176	51.76%	
Female	196	50.4	32	65.31%	164	48.24%	
Age							0.07
Under 18	9	2.3	0	0	9	2.65%	
20-24	304	78.1	34	69.39%	270	79.41%	
25-30	74	19.0	14	28.57%	60	17.65%	
Over 30 years old	2	.5	1	2.04%	1	0.29%	
BMI							0.38
Normal	203	52.2	27	55.10%	176	51.76%	
Underweight	33	8.5	3	6.12%	30	8.82%	

Overweight	98	25.2	9	18.37%	89	26.18%	
Obese	55	14.1	10	20.41%	45	13.24%	
Marital status:							0.65
Married	12	3.1	2	4.08%	10	2.94%	
Single	377	96.9	47	95.92%	330	97.06%	
GPA							0.267
Excellent (4.5 and above)	183	47.0	21	42.86%	162	47.65%	
Very Good (3.75 - 4.49)	134	34.4	20	40.82%	114	33.53%	
Good (2.75 - 3.74)	66	17.0	6	12.24%	60	17.65%	
Fair (2.00 - 2.74)	6	1.5	2	4.08%	4	1.18%	
Satisfaction with current GPA:							0.283
Very satisfied	98	25.2	15	30.61%	83	24.41%	
Satisfied	125	32.1	10	20.41%	115	33.82%	
Neither satisfied nor dissatisfied	68	17.5	8	16.33%	60	17.65%	
Dissatisfied	69	17.7	10	20.41%	59	17.35%	
Very dissatisfied	29	7.5	6	12.24%	23	6.76%	
Job status:							0.685
I don't have another job	368	94.6	45	91.84%	323	95.00%	
Less than 6 hours	12	3.1	2	4.08%	10	2.94%	
6-10 hours	6	1.5	1	2.04%	5	1.47%	
above 10 hours	3	.8	1	2.04%	2	0.59%	
Smoking status:							0.837
I don't smoke.	334	85.9	42	85.71%	292	85.88%	
Less than 3 years	22	5.7	2	4.08%	20	5.88%	
3-6 years	22	5.7	3	6.12%	19	5.59%	
6-9 years	8	2.1	1	2.04%	7	2.06%	
Above 9 years	3	.8	1	2.04%	2	0.59%	

Relationship between IBS and demographic characteristics of respondents
No significant difference was noted between all the variables and the diagnosis of IBS except the gender. Female gender was statistically significantly higher than males in the diagnosed IBS participants (n= 32 versus 17) with odd ratio of 2.02, 95% CI (1.08 to 3.78), P = 0.028 (Table 1).

Identification of IBS diagnosis
As responded by the participants, 49 (12.6%) reported that they were diagnosed with IBS by their physician. However, according to a scoring system that follows 16 questions, we could identify 228 participants (58.6%) with low risk for IBS diagnosis (score <15) and 159 participants (40.9%) with mild risk (Score = 15-24), while only two participants with high risk for IBS (0.5%) (Score = 25-30). Interestingly, these two cases reported that the physician did not diagnose them. The two cases were in the third and fourth year, age group between 20 to 24 years old. There was a significant difference between the number of participants with a physician IBS diagnosis and risk categories (P < 0.001).

Relationship between IBS risk subgroups and characteristics of lifestyle of respondents
Since most of the sample individuals had normal BMI and negative smoking history, no significant difference was noted between the subgroups. However, the highest percentages in each subgroup reported that they do not exercise, with no significant difference as well. A significant difference was noted among subgroups in terms of daily sleeping duration and coffee consumption. The majority of low and mild-risk participants reported sleeping between 4 to 8 hours (86% and 83%, respectively) and consuming one to three cups of coffee (68% and 71%). While the two cases with high risk, one case reported daily sleeping less than 3 hours, and the other one more than 8 hours. Both of them reported consumption of daily three to five cups of coffee. No significant positive

correlation was observed in risk subgroups with sleeping duration (r = 0.095, P = 0.06) and coffee consumption (r = 0.063, P = 0.214). Eating habits showed an insignificant difference; however, the highest reported components in low and mild risk groups were carbohydrate (90.4% and 93.7%, respectively) followed by protein (82.9% and 73.6%, respectively) then fats (73.2% and 72.3%, respectively) and lastly fruit and vegetables (48.2% and 39%, respectively). Of note, fat, fruit, and vegetables consumption were not reported by any of the two cases of the high-risk group (Table 2).

Table 2 Relationship between IBS risk subgroups and characteristics of lifestyle of respondents

	Low (n=228) N (%)	Mild (n=159) N (%)	High (n=2) N (%)	P value
IBS diagnosed				<0.001
Diagnosed	9 (4%)	40 (25%)	0	
Not	219 (96%)	119 (75%)	2 (100%)	
BMI				0.973
Normal	119 (52.2%)	83 (52%)	1 (50%)	
Underweight	19 (8.33%)	14 (8.8%)	0	
Overweight	59 (25.88%)	38 (23.9%)	1 (50%)	
Obese	31 (13.6%)	24 (15%)	0	
Smoking				0.24
I don't smoke.	200 (87.7%)	133 (83.65%)	1 (50%)	
Less than 3 years	13 (5.7%)	9 (5.66%)	0	
3-6 years	11 (4.8%)	10 (6.29%)	1 (50%)	
6-9 years	3 (1.32%)	5 (3.14%)	0	
Above 9 years	1 (0.44%)	2 (1.26%)	0	
Exercise (per week)				0.234
I don't workout	107 (46.9%)	86 (54%)	1 (50%)	
Less than 1 hour	51 (22.37%)	36 (22.6%)	0	
1 - 2 hours	43 (18.86%)	16 (10%)	1 (50%)	
Above 2 hours	27 (11.84%)	21 (13.21%)	0	
Sleeping duration				< 0.001
Less than 3 hours	3 (1.32%)	3 (1.89%)	1 (50%)	
4 - 8 hours	196 (86%)	132 (83%)	0	
More than 8 hours	29 (12.72%)	24 (15%)	1 (50%)	
Coffee consumption				0.001
I don't drink coffee	51 (22.37%)	29 (18.24%)	0	
1 - 3 cups	155 (68%)	113 (71%)	0	
3 - 5 cups	17 (7.46%)	15 (9.43%)	2 (100%)	
More than 5 cups	5 (2.19%)	2 (1.26%)	0	
Eating habits				
Protein	189 (82.9%)	117 (73.6%)	1 (50%)	0.053
Carbohydrate	206 (90.4%)	149 (93.7%)	1 (50%)	0.054
Fruit and vegetables	110 (48.2%)	62 (39%)		0.089
Fats	167 (73.2%)	115 (72.3%)		0.069
Others	16 (7%)	12 (7.5%)	1 (50%)	0.07

Relationship of IBS with psychological well-being

Regarding having anxiety, stress, or depression episodes, a significant difference was noted in the risk subgroups (P < 0.001). The two cases of the high-risk group, 87.4% of the mild risk group and 59% of the low-risk group, reported a positive history of the abovementioned episodes. Likewise, the physician diagnosed 40 of 49 patients (81.63%) with IBS, and 69.4% who were not diagnosed reported the same positive history with insignificant difference, OR = 1.968, 95% CI (0.9 to 4.2) P = 0.08. Moderate level of anxiety was the most reported level in all groups.

A total of 16 participants from the low-risk group (7%) and nine from the mild risk group (5.66%) had chronic diseases, compared to two cases (4.08%) from diagnosed participants, with no significant difference in both classifications, OR 0.5, 95% CI (0.122 to 2.4), P = 0.54. A significant difference was present among the risk group in case of any previous surgeries or trauma in the abdomen, yet this difference was not presented among the diagnosed group, OR = 0.79, 95% CI (0.22 to 2.8), P = 0.7 (Figure 1).
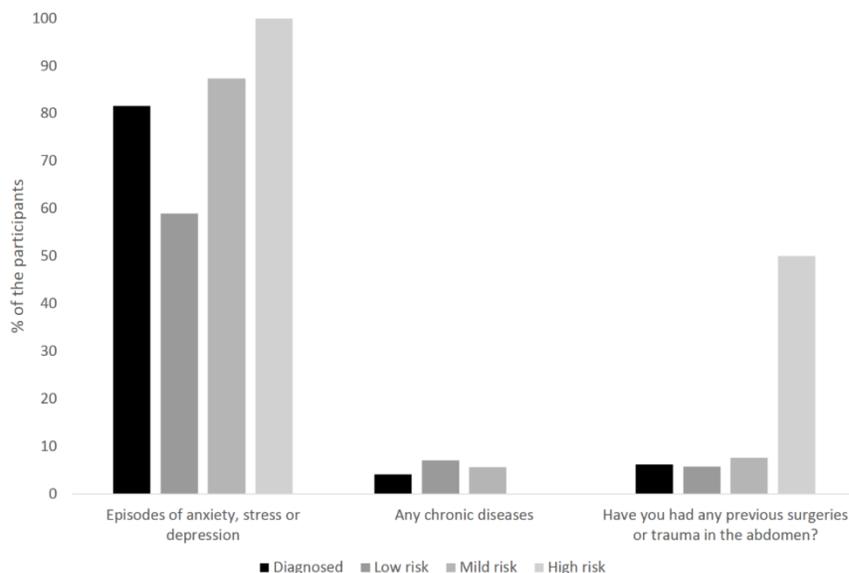

Figure 1 Relationship of IBS with psychological well-being

Prevalence of IBS among Medical students

Counting on self-reporting IBS diagnosis by a physician, prevalence is 12.6%, 95% CI (9.5 to 15.9). The highest frequencies were observed in the internship year students (n = 18, 18.8%), followed by the third-year medical students (n = 12, 15.8%), the fourth year (n = 8, 11.6%), and the first year (n = 5, 11.5%) meanwhile no cases were noted in the preparatory year (Table 3).

Table 3 Prevalence of IBS among medical students

	IBS diagnosis N (%)	Low risk N (%)	Mild risk N (%)	High risk N (%)
Preparatory year (n = 14)	0	13 (93%)	1 (7.1%)	0
First Year (n = 42)	5 (11.5%)	29 (69%)	13 (31%)	0
Second year (n = 23)	1 (4.3%)	18 (78.3%)	5 (21.7%)	0
Third year (n = 76)	12 (15.8%)	41 (54%)	34 (44.7%)	1 (1.3%)
Fourth year (n = 69)	8 (11.6%)	32 (46.4%)	36 (52.2%)	1 (1.4%)
Fifth year (n = 69)	5 (7.2%)	33 (47.8%)	36 (52.2%)	0
Internship year (n = 96)	18 (18.8%)	62 (64.6%)	34 (35.4%)	0

However, according to the scoring system, the high-risk group was counted in 0.5% of the sample; one case in the third medical year (1.3%) and another one in the fourth year (1.4%). The highest frequencies of mild risk were noted in both the fourth and fifth years (52.2%), after that, the third year (44.7%) and the internship year (35.4%).

4. DISCUSSION

IBS is a multifactorial functional gastrointestinal disorder. Lifestyle habits and stressors could influence and trigger the condition. In this study, we identified IBS frequencies and associated risk factors, including demographic characters, lifestyle habits, and associated psychological disorders in medical student population in Riyadh. Our results showed an IBS prevalence of 12.6% as diagnosed with IBS by a physician, and we also found that 40.9% and 0.5% of students have mild and high risk of IBS diagnosis respectively. This overall prevalence is lower than a published study conducted in Jeddah in 2013 that showed an IBS prevalence of 31.8% among medical students; however, this study utilized Rome III Criteria to diagnosis IBS (Ibrahim et al., 2013). Similar to these diagnosis methods, the prevalence of IBS was identified as 14.4% among nurses in the same setting (Ibrahim et al., 2016).

Despite this high disease prevalence, optimal management is still challenging because of the multi-systems interactions. IBS is currently diagnosed according to the Rome IV criteria that depends on clinical symptoms, sleep quality, and the psychological state of IBS patients (Palsson et al., 2016). Usually, IBS is divided into three subsets, in which bowel habit change is predominant, such as IBS with constipation (IBS-C), IBS with diarrhea (IBS-D), or IBS with both changes (IBS-M) (Longstreth et al., 2006). Thus, medical treatment is based on managing symptoms such as pain, cramping, bloating, diarrhea, or constipation by over-the-counter medications. According to the American College of Gastroenterology, lifestyle and dietary interventions have been the first line of management, including dietary manipulation and increased fiber intake and modification of the microbiota followed by peppermint oil andloperamide then lastly along with Antidepressants, psychological therapy, serotonergic and prosecretory agents (Ford et al., 2014).

The female gender has ahigh risk of developing IBS, and it was reported that there is a female predominance in IBS diagnosis, (Drossman et al., 1993) our result showed a two-fold increase in the risk for females to have IBS. A similar higher ratio was reported in medical students with IBS, females (85.29%) compared to males (14.71%) in Pakistan (Naeem et al., 2012). The prevalence of IBS among female nursing and medical school students was 41.5% compared to 13.8%of males in Japan (Okami et al., 2011). This may suggest a role for sex hormones in the pathophysiology of IBS, including ovarian hormones that could alter neuromodulator systems affecting visceral pain perception through brain-gut axis or altered immune system affecting gut barrier function (Meleine & Matricon, 2014). According to the literature, it was reported that during menopause and menses, there was an increase in gastrointestinal symptomatology caused by the withdrawal of estrogen and progesterone hormones (Heitkemper & Chang, 2009). Compared to premenopausal women, IBS symptoms were found to be severe in postmenopausal women (Lenhart et al., 2020). In addition, there were significant differences between IBS female and male patients in the presence of chronic pain syndromes and the efficacy of serotonergic drugs in IBS treatment, suggesting an influence caused by sex hormones (Mulak et al., 2014).

Other associated demographic risk factors have been explored, such as positive history in first-degree relatives among diagnosed IBS medical students in studies conducted in Egypt and China (Elhosseiny et al., 2019; Wang et al., 2016). This may be explained by similar environmental factors and increased awareness of reporting gastrointestinal symptoms (Locke et al., 2000). There is a well-established relationship between physiological state and IBS. Anxiety and depression are presented as associated co-morbidities that patients with anxiety or depression had two times higher risk to develop IBS (Sibelli et al., 2016). In this study, our results showed a prevalence of anxiety in IBS diagnosed students of 81.63%. We depended on Q19 and 20 to assess having episodes of anxiety, stress, or depression and its level. Interestingly half of the diagnosed students reported mild to moderate levels. These emerging results are consistent with the study conducted in Jeddah in 2013, in which the prevalence of anxiety and depression in diagnosed students were 40.1% and 41.9%, respectively (Ibrahim et al., 2013).

Stress could aggravate IBS through several mechanisms by alternating gut motility and microbiota, affecting visceral nociceptive behaviors and pain response (Moloney et al., 2016). On another hand, with approximately two times higher risk, IBS patients may develop subsequent psychosocial problems such as depression, anxiety, sleep disorder, and bipolar disorder within one year and up to five years after IBS diagnosis (Lee et al., 2015). In a multicenter randomized controlled trial conducted on 494 IBS patients referred for psychological treatment, hypnotherapy, either group or individual hypnotherapy, was found to be more effective than educational, supportive therapy, through visceral perception threshold modification and improvement of clinical symptoms (Flik et al., 2019). Since most of the sample were not smokers, we could only identify smoking frequency in diagnosing IBS as 14.3%, with no significant association between smoking and IBS. A similar insignificant association was reported in other studies; the percentage of smokers in IBS students ranged from 10% to 33%. (Ibrahim et al., 2013; Okami et al., 2011). Also, in our study, about 38.8% of diagnosed IBS were overweight or obese, compared to 66% reported in a study of Jeddah (Ibrahim et al., 2013). Among classified risk subgroups, we noticed a significant difference in daily sleeping duration and coffee consumption. About 8.2% of diagnosed IBS reported unhealthy sleeping duration, and 16.3% consumed more than three cups of coffee.

Regarding other lifestyle habits, our study showed no significant difference in terms of exercise between classified risk, and 47% of diagnosed IBS did not exercise;however, IBS frequency was reported to be lower in students who exercise regularly (Ibrahim et al., 2013; Okami et al., 2011). Exercise and physical activities may increase colon transit time. Improvement in IBS symptoms was demonstrated in a randomized clinical trial in the structured physical activity group compared to the control group (Johannesson et al., 2011). In a recent narrative review, yoga was found to be effective, even superior to medications, through targeting multiple systems involved in IBS pathophysiology resulting in improved physical and mental health (D'Silva et al., 2020). Also, no significant difference was noted in consuming type of food; the same results were reported in a published study done in Jeddah (Ibrahim et al., 2013). Nevertheless, processed food was consumed by IBS-diagnosed nursing and medical students in Japan (Okami et al., 2011). In a most recent survey study, among 25 patients with IBS, significantly higher consumption of soybean, spicy food, dry-fried nuts, egg, barbecue, and coarse grain were noted in both quantity per time and the intake frequency compared to non-IBS (Meng et al., 2021). Moreover, the present study adds to the growing body of research which indicates that medical students, in general, are at higher risks of developing IBS, which necessitates building a structural advising framework that can help in early intervention.

5. CONCLUSION

Due to the stressful lifestyle of medical students and associated risk factors, especially anxiety and depression, medical students are at high risk of developing IBS risk factors. Anti-stress measurements and early screening for psychological disorders are highly recommended for medical students to cope with such psychological stress and anxiety. However, proper awareness, preventive measurements, and behavioral therapy could manifest an excellent lifestyle to decrease disease burden and unfavorable outcomes while improving quality of life.

Limitations

This study has some limitations; firstly, results were obtained from self-administered questionnaires with the possibility of reporting bias. Secondly, we depended on one question to diagnose IBS, not Rome criteria; however, to overcome this, a system score was used to classify the students into a different risk group to explore more about associated risk factors. National meta-analysis studies with a broader scope could help supplement valuable insights into the risk factors of IBS and its association among people working or studying in the healthcare field.

Authors' Contributions

S.S.Z, A.N.A, A.A.A, H.A.A, A.A conceived and planned the study; R.I.A, H.A.A, N.H.A, F.K.Y obtained the data; F.K.A and RA performed the statistical analysis and data summarization; S.S.Z drafted the manuscript with support from F.K.A, which was then reviewed by A.A; All authors discussed the results and commentedon the manuscript, and agreed to the final version of it.

Ethics approval and consent to participate

This study was approved by the ethical research committee of the Institutional Review Board (IRB) of Imam Mohammed Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia, (HAPO-01-R-0011, Project No. 119-2021). The questionnaire contained no identifying information, and the participation was voluntary. All methods were carried out in accordance with relevant guidelines and regulations.

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Conflict of interest

The authors declare that there are no conflicts of interest.

Data and materials availability

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

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