

Impact of Irritable Bowel Syndrome on Healthcare Students' Quality of Life

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Abstract Irritable bowel syndrome is one of the most prevalent diagnosed gastrointestinal disorders. Although IBS is a non-life-threatening condition, it can have a profound negative impact on patients' quality of life (QoL) (i.e., affecting sleep quality, concentration, energy levels, self-esteem personal relationships, travel and work attendance, performance, and productivity). There is limited information, however, in Saudi Arabia, on the effect of IBS has on the quality of life of students studying health care degrees. **Aim:** To measure the prevalence of IBS in a group of health care students in Taif, Saudi Arabia, and to determine the relationship between anxiety and IBS; and its' impact on their quality of life. **Methods:** An exploratory cross-sectional study was conducted in the Health College at Taif University (TU), through an internet-based questionnaire. The study was carried out across the six specialties at TU: nursing, physiotherapy, laboratory, radiology, medicine, and pharmacology. A sample of 351 students were included, in the academic year of 2020–2021. **Results:** A total of 116 students had symptoms of IBS at a frequency of 33.05 %. Most of the study sample were females (77.5 %), with their ages ranging between 18 -22 ± 2.87 (63.6%). Students from nursing school who experienced symptoms of IBS comprised 65% of the studied sample. A significant association between the frequency of meals eaten per day and IBS (chi-square p-value = 0.002) was reported. High fat diet was associated with symptoms of IBS in 38.2%, and spicy food in 30.5% of the studied sample. A statistically significant association was observed between anxiety and IBS and between Quality of Life and IBS. Eight types of regression models were used to identify the effect of IBS on healthcare students' quality of life. Results showed a strong relationship between IBS in healthcare students and quality of life (QoL), specifically food avoidance and interference activity. **Conclusion:** Undergraduate students, particularly, those studying health care are likely to be subjected to substantial amounts of anxiety, hence contributing to the development of IBS symptoms, which consequently impacts their quality of life, specifically food avoidance and interference with daily activities. Raising awareness among students regarding IBS-related symptoms and factors leading to its development such as anxiety, would probably play an important role in mitigating the impact of this disorder on their quality of life.

Keywords: irritable bowel syndrome, anxiety, quality of life, healthcare students

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1. Introduction

Irritable bowel syndrome is a functional disorder of the gastrointestinal tract manifesting as chronic or recurrent abdominal pain/discomfort, with altered bowel habits (i.e., constipation, diarrhea, or both in alternation) [1,2,3]. It is estimated to affect approximately 1 in 10 people worldwide [4,5]. According to previous global epidemiological studies and population-based surveys on gastrointestinal disorders [6-9], of the 33 recognized adult functional gastrointestinal disorders (FGIDs), irritable bowel syndrome (IBS) is the most commonly diagnosed gastrointestinal condition, with an estimated worldwide

prevalence of 12% [6,7,8,10]. Demographic predictors of IBS include gender, age, and socioeconomic status [10]. The odds of having IBS are higher in women than in men, it is approximately 1.5 times more common in women than men [10]. It is also more prevalent in those of lower socioeconomic status [10], and is mostly diagnosed in patients younger than 50 years of age [8,10].

Although IBS is a non-life-threatening condition, it can have a profound negative impact on patients' quality of life (QoL) (i.e., affecting sleep quality, concentration, energy levels, self-esteem personal relationships, travel and work attendance, performance, and productivity) [1,2]. Results of a health-related quality of life survey that was designed to assess the impact of IBS on the quality of life of the patients revealed a significant decline in the scores

of mental health and social function domains in IBS patients [13,14].

Work impairment is a substantial problem in patients with IBS [15]. Dean et al. found IBS to be associated with a 21% reduction in work productivity: equivalent to working less than four full days in a 5-day work week [16]. Hahn et al. measured the impact of IBS on absenteeism. Results indicated the number of missed workdays increased significantly as the severity of IBS symptoms increased [17]. In addition, a study by Fallah et al. found IBS was the second leading cause of lost workdays after the common cold [12,18].

There is no consensus on the etiology of IBS, but physiological and psychological factors have been linked with the onset and severity of this disorder [9,10]. Physiological factors include abnormal motility, visceral hypersensitivity, inflammation, abnormalities of autonomic activity, and central nervous system modulation [10]. The most common psychological disorders are anxiety, depression, panic, posttraumatic stress, and somatization disorders [8]. A recent study by Umrani et al. reported significantly higher anxiety levels in participants with IBS compared to participants without (53.0% vs. 23.0%). Similarly, depression was significantly more common in participants with IBS (50.6% vs. 21.5%) [1]. In a meta-analysis carried out to compare depression and anxiety levels between IBS patients and healthy controls, data showed depression and anxiety levels significantly higher in IBS patients than in healthy controls [11].

There is growing concern regarding the increased prevalence and severity of mental health disorders in university students, particularly those in the medical and health science fields [9-11]. They experience high levels of stress and anxiety due to the excessive workload and long study hours [12,13]. Several studies have reported a high prevalence of comorbid psychiatric conditions, especially anxiety, among students suffering from IBS. A recent study carried out in Korea on 200 college students with IBS, showed that the severity of irritable bowel syndrome was influenced directly by anxiety and sleep [13]. In Jeddah, Saudi Arabia, a study conducted to determine the prevalence and predictors of IBS among medical students and interns in King Abdulaziz University, reported a prevalence of IBS of 31.8%. Morbid anxiety was recorded as the second highest predictor of IBS [14,15]. Similarly, a study carried out on medical students in Riyadh, Saudi Arabia, reported more than 50% students with moderate/high anxiety levels; and found a significant association between anxiety and IBS [14]. It appears, however, that previous research on the topic of IBS in Saudi Arabia has focused mainly on medical and nursing students [14,15,23]. To date, there are limited data regarding the prevalence of anxiety and its severity on IBS among students in other healthcare professions, including nursing, pharmacy, dentistry, physiotherapy, laboratory, and radiology. Firstly, healthcare degrees in Saudi Arabia are predominantly taught in English and for most of these Saudi students, English is a new language for them to learn, which is a major risk factor for anxiety disorder [16]. Secondly, healthcare professions also require long study hours, tough exams, sleep deprivation and clinical training, which have been explained as main predictors of anxiety

in medical students [9] [14,15] [17] [20]. Finally, although numerous studies in Saudi Arabia have addressed the impact of IBS on quality of life either in high schools, hospitals, and health care settings [21-24]. There appears to be limited published data available, on the impact this syndrome might have upon the quality of life of university students affected, particularly those residing in the Taif region of Saudi Arabia.

The present study therefore aims to:

- 1) Measure the prevalence of IBS in a group of health care students in Taif, Saudi Arabia.
- 2) Determine the relationship between anxiety and IBS in a group of health care students in Taif, Saudi Arabia.
- 3) Investigate the associations between IBS and quality of life in a group of health care students in Taif, Saudi Arabia.

2. Materials and Methods

2.1. Research Design

This exploratory cross-sectional study was conducted in the Health College at Taif University (TU), through an internet-based questionnaire. The study was carried out across the six specialties at TU: nursing, physiotherapy, laboratory, radiology, medicine, and pharmacology. A sample of 351 students were included, in the academic year of 2020–2021, ages ranging between 18 to 22 years, comprising first year students to sixth year students. Data were collected over a period of 3 months, February 2021 to April 2021.

2.1.1. Questionnaires

A validated IBS questionnaire was used. The questionnaire consisted of four parts. Firstly, a self-administered questionnaire, to collect baseline information such as socio-demographics and academic data; family history of IBS; previous diagnosis of IBS (carried out by a physician); previous chronic medical diseases; daily lifestyle habits such as number of meals taken and smoking history. Rome IV categories and diagnosis questionnaire was used in the second part of the data collection process [25]. The Rome IV comprises 16 questions that help determine the type and extent of subject's IBS, based on number of visits made to the physician, level and position of abdominal pain, frequency of symptoms, type of symptoms (particularly after eating a specific food item), duration of symptoms (i.e., ≥ 6 months), pain and frequency of pain during defecation, stool frequencies, and medication intake [25]. A Hamilton Anxiety Rating Scale (HAM-A) was used in the third stage of the data collection process [26]. This questionnaire focused on the subject's psychological and physiological state, such as anxiety, stress, depression, insomnia, muscular and sensory somatic symptoms, cardiovascular symptoms, respiratory symptoms, gastrointestinal symptoms, genitourinary symptoms, and autonomic behavior [26]. Subjects rated their overall symptom severity from 0 (no symptoms) to 4 (severe symptoms). Finally, an irritable bowel syndrome-quality of life measure (IBS-QOL) was applied [27]. This

comprises a 34-item questionnaire, divided into two scales, involving questions concerning participants quality of life [27]. The first scale consists of 15 items, scored from 1 (not at all) to 5 (extreme yes), and the second scale contains 19 items, scored from 1 (not at all) to 5 (a great deal) [27]. A pilot study was conducted prior to data collection on ten participants to test clarity and applicability of the questionnaires, and modifications were carried out where/when necessary. The study had been approved by the ethics committee of TU. The aim of the study and confirmation of anonymity of the data were provided.

2.1.2. Data Analysis

Study coding and data extraction were carried out using Microsoft Excel. Data analysis was performed using the SPSS 20.0 (SPSS Inc., Chicago, IL). Distributions of sex and lifestyle factors were analyzed using Pearson's χ^2 . BMI = kg/m², where kg is a person's weight in kilograms, and m² is their height in meters squared. BMI was categorized as follows: underweight (<18.5), normal weight (18.5–24.9), overweight (25–29.9), and obesity (BMI $\geq$ 30 or greater). Descriptive analysis of the study population was performed (i.e., mean $\pm$ standard deviation for continuous variables and frequencies [percentages] for qualitative variables), the relationship between demographic factors, clinical factors, and food behaviors, with IBS was analyzed using Chi-square test. Anxiety and quality of life scores in IBS status were compared using t-tests. A binary logistic regression analysis was performed to find the association between anxiety, and quality of life.

The dependent variable was IBS, and the independent variables were anxiety, and quality of life. Quantitative data were presented as mean $\pm$ SD, and $p < 0.05$ was considered statistically significant.

2.1.3. Results

It was found that 116 students had symptoms of IBS at a frequency of 33.05 %. Most of the study sample were females (77.5 %), with their age ranging between 18 -22 (63.6%). Overweight/obese students comprised 29.9 %, while 35.3% were underweight, and 31.9% were within the normal BMI range. As for their marital status, 10.8 % were married with children, 2.6% were married without children, while 85.8% were single. Most of the studied sample were in nursing school (46.1%). A high percentage of these students had parents with more than a sufficient monthly income (73.3%), while only 21.5% had low-income parents. In addition, 38.7 % of students reported a positive family history of IBS, 12.5% reported suffering from psychological problems, 69.5% reported no previous medical surgeries, 14 % were smokers, and 16% reported suffering from various chronic diseases. Ten percent had one meal/day, 51.5 % had two meals/day, 30.8% had three meals daily, and 7.7 % would have more than three meals/day. High fat diet was associated with symptoms of IBS in 38.2% of the studied sample, spicy food in 30.5%, high intake of fiber in 10%, and finally, chocolate, tea and caffeine were associated with symptoms in 21.3% of these students.

Table 1. Association between socio-demographic factors and IBS

Socio-demographic		IBS				Chi-square	P –value
		NO (235)		YES (116)			
		F	%	F	%		
Gender	Female	71	19.7	201	58.2	0.340	0.018
	Male	17	4.7	63	17.5		
Age	18-22	152	64.7	73	62.9	2.87	0.412
	23-27	45	19.1	28	24.1		
	27-more	38	16.2	15	13		
Health college	Dental	9	3.8	4	3.4	17.52	0.014
	Laboratory	18	17.2	20	17		
	Medicine	17	7.3	7	6		
	Nursing	162	68.9	72	62.2		
	Pharmacology	22	9.4	7	6		
	Physiotherapy	7	2.9	6	5.2		
Work part time	No	186	79.1	87	75	0.773	0.379
	Yes	49	20.9	29	25		
Family income	11000-more(high)	92	39.2	39	33.6	12.02	0.007
	4000-6000 (low)	41	17.4	35	31		
	6000-11000	102	43.4	40	34.4		

In terms of the association between socio-demographics and IBS among respondents, Table 1 shows a significant association between the health college and IBS, the probability value for chi-square is 0.014. Nursing and laboratory students experienced IBS more than others (62.2% and 17% respectively). There is also a significant association with gender and the level of family income the

probability value for chi-square is 0.018 and 0.007, respectively.

Table 2 shows a statistically significant difference between IBS symptoms and previous medical operations, chronic diseases, and family history of IBS at a chi square p-value of 0.003, 0.000 and 0.001, respectively.

Table 2. Association between clinical factors and IBS

Clinical factors:		IBS				Chi-square	P –value
		NO (235)		YES (116)			
		F	%	F	%		
BMI	Underweight	82	34.9	48	41.4	2.69	0.442
	Normal weight	80	34	37	32		
	Over weight	51	21.7	19	16.3		
	Obesity	22	9.4	12	10.3		
Previous medical operations	No	176	74.9	68	58.6	11.55	0.003
	Yes	59	25.1	48	41.4		
Suffer from any psychological problems	No	206	87.7	101	87.1	0.052	0.859
	Yes	29	12.3	15	12.9		
Suffering from chronic diseases	No	213	90.6	84	72.4	24.1	0.000
	Yes	22	9.4	32	27.6		
Does anyone in your family suffer from IBS?	No	159	67.7	56	48.3	13.181	0.001
	Yes	76	32.3	60	51.7		

Table 3. Association between behavioral factors and IBS

Food and smoking behaviour:		IBS				Chi-square	P –value
		NO (235)		YES (116)			
		F	%	F	%		
Evaluation of food quality	Excellent	8	3.4	5	4.3	0.295	0.863
	Good	145	61.7	73	62.9		
	Poor	82	34.9	38	32.8		
Eating meals per day	More	21	8.9	6	5.2	14.52	0.002
	One meal	18	7.7	17	14.7		
	Three meals	85	36.2	23	19.8		
	Two meals	111	47.2	70	60.3		
Food associated with symptoms	Food and drinks such as chocolate, alcohol, or caffeine	39	16.6	27	23.3	8.051	0.064
	Fried and fatty foods	101	43	35	30.2		
	Spicy food	67	28.5	44	37.9		
	Too much Fiber	28	11.9	10	8.6		
Smoking	No	190	80.9	102	87.9	2.78	0.095
	Yes	45	19.1	14	12.1		

Table 4. Association between gender and IBS based on predominant bowel movement

			IBS with (IBS-C)	IBS with (IBS-D)	IBS with mixed bowel habits (IBS-M)	Unclassified IBS (IBS-U)
Gender	Male	Count	19	25	18	18
		% of Total	5.3%	6.9%	5.0%	5.0%
	Female	Count	75	57	67	82
		% of Total	20.8%	15.8%	18.6%	22.7%
Total		Count	94	82	85	100
		% of Total	26.0%	22.7%	23.5%	27.7%

Table 3 shows a significant association between the frequency of meals eaten per day and IBS (chi-square p-value = 0.002).

According to Table 4, the most common subtype of IBS in male patients was diarrhea (IBS-D) (7% diarrhea vs 5% constipation), while constipation (IBS-C) was the most frequent type among females (21% constipation vs 16% diarrhea).

Table 5. shows lower average anxiety mean scores for

health care students with no IBS symptoms ($M = 12.4$, $SD = 10.43$) than those who experienced symptoms ($M = 18.96$, $SD = 10.57$, $p\text{-value} = 0.000$). In terms of quality of life and IBS, a two-tailed independent sample t-test ($\alpha = 0.05$) was used to compare the means. Results showed a significant difference ($t\text{-score} = 6.128$, $p = 0.000$). Health care students with IBS reported lower quality of life scores ($M = 52.17$, $SD = 21.06$) than those without IBS ($M = 67.41$, $SD = 23.59$).

Table 5. Comparison of anxiety, quality of life scores with IBS

	IBS				T	p-value
	No		Yes			
	Mean	Std.	Mean	Std.		
Anxiety	12.4	10.43	18.96	10.57	-5.512	0.000
Quality of Life	67.41	23.59	52.17	21.06	-6.128	0.000

Table 6. Eight regression models examining the effect of IBS on health students' quality of life

Dependent Variables	Constant	B	t – statistic for B	P.value	R-square
Food Avoidance	1.180	0.603	5.146	0.000	.0690
Interference Activity	1.135	0.597	6.028	00.00	.0930
Sexual	0.995	.5140	4.575	0.000	.0560
Dysphoria	1.142	.5110	4.965	0.000	0.650
Health Worry	1.325	0.435	4.083	0.000	0.450
Social Reaction	1.320	0.413	3.799	0.000	0.390
Body Image	1.260	0.396	3.849	0.000	.0400
Relationship	1.398	.2680	2.463	0.014	0.017

A multiple regression model shows a significant impact of IBS on student's quality of life, specifically food avoidance, followed by the interference activity. On the other hand, the variables least influenced by IBS were relationships and body image.

3. Discussion

The present study was designed to assess anxiety and quality of life in a group of healthcare students exhibiting symptoms of IBS in Taif, Saudi Arabia. The leading hypothesis was that anxiety is highly associated with IBS symptoms which has a great impact on the quality of life of students in the health field [28,29]. The prevalence of IBS amongst our study group was 33 % which is slightly higher than previous studies conducted in Jeddah, and in the central region of Saudi Arabia; where IBS prevalence rates were reported to be 31.8% and 30.5%, respectively [15,24]. In addition, prevalence rates in the current study were relatively higher than surrounding Arab countries such as Lebanon and Egypt where the recorded overall prevalence of IBS among university students was 20% and 31.7%, respectively [24,30].

Gender appears to play an important role in IBS. Most IBS cases, in this study, were females at a percentage rate of 58.2%. These results are consistent with studies carried out amongst health students at King Saud bin Abdul-Aziz University for Health Sciences in Saudi Arabia; and medical students at Ain Shams University, Egypt, and Magnolia Medical University, China [9] [14] [31]. Similarly, according to a systematic review by Kim et al., irritable bowel syndrome has been reported to be a more common disease in women, with a female-to-male ratio of 2–2.5:1, in terms of those who seek medical care [32]. In addition, studies in Japan and India reported higher IBS cases in females than males, with reported 41.5% of females compared to 13.8% of males in Japan [33], and 22.7% of females and 8.9% of males in India [34]. The

underlying reasons for the female predominance of IBS, remains largely unknown, as limited data exists in the literature on gender differences in IBS prevalence rate [32] [35,36,37]. It has been suggested, however, that the greater prevalence of IBS in women reflects physiologic differences in disease expression, and symptom perception (an underestimation of prevalence in men due to symptom under-reporting) [38,39].

Results also showed diarrhea as the most common subtype of IBS in male patients (IBS-D) (7% diarrhea vs 5% constipation), while constipation (IBS-C) was the most frequent type among females (21% constipation vs 16% diarrhea). This is consistent with several studies demonstrating a female predominance in IBS-C [40,41]. A meta-analysis by Adeyemo et al. reported a greater prevalence of constipation-associated symptoms in women, particularly bloating and abdominal distension, than men. Men had a greater prevalence of diarrhea-associated symptoms of loose-watery stools and increased stool frequency [40]. Similarly, both studies by Anbardan et al. and Herman et al. reported higher prevalence of bowel movements and looser stool in men while women generally reported abdominal pain and constipation-related symptoms [41,42].

Despite limited comprehensive data, psychological (i.e., depression, anxiety), and anatomical factors (i.e., sex hormones) are believed to contribute to gender-related differences in the prevalence and symptoms of irritable bowel syndrome [38,43]. It is therefore necessary to explore the mechanisms underlying these gender-related differences, to develop different treatment strategies appropriate to meet the specific needs of women versus men.

An association between previously undergone surgeries and IBS symptoms was also noted in our study sample, although the specific types of surgeries associated with IBS symptoms were not explicitly assessed. Longstreth et al., on the other hand, reported an independent association between IBS diagnosis and increased rates of cholecystectomy, appendectomy, hysterectomy, and back surgery [44]. Hence, further research is warranted to investigate specific surgeries responsible for triggering IBS symptoms, in order to avoid future nonessential surgeries, particularly on those pre-disposed to the development of IBS [44].

Results also suggested that genetics may play a role in the etiology of IBS as family history was reported as statistically significant. These findings are consistent with previous research. According to a study by Whorwell et al., one-third of IBS patients reported another family member with IBS, even in patients without a concurrent psychiatric diagnosis [45,46]. In another study, having a first-degree relative with IBS was one of the main characteristics found to be predictive of IBS [46,47]. Nonetheless, other studies have shown that there may be individuals with sporadic or non-familial IBS as well [46,48].

Eating habits and dietary balance can play a very important role in the development and severity of IBS-related symptoms. These factors are particularly important in students as they are more likely to be less cautious with their diet [9]. The dietary variable assessed in the current study was meal frequency. Meal frequency appears to be one of the less investigated dietary habits with relation to functional GI disorders [49]. A highly significant value

was detected between meals eaten per day and IBS symptoms ($p=0.002$). Irritable bowel syndrome was more prevalent in students that had less meals per day (1-2 meals/day compared to those who had 3). Findings of several previous investigations were consistent with the current study [49-51]. A study by Vakhshoori et al., reported declined risk of IBS symptoms among female participants consuming three main meals each day [49]. A cross-sectional study by Kim et al., reported similar findings [51]. Individuals suffering from IBS missed their daily meals more frequently compared with healthy subjects [51]. A possible explanation for this relationship would be related to GI motility [49,52]. Skipping meals is associated with the loss of gastro-colonic reflex and impacted faeces [49,52]. By increasing frequency of main meal taking, this reflex might be improved which could lead to decreased symptoms of IBS [49,52].

The importance of psychological factors in IBS is well established in previous research. It is believed that the changes in central nervous system (CNS) in response to psychological and physical stressors lead to colonic spasms, which results in the manifestation of IBS symptoms [9,14]. University students are likely to be under a lot of stress due to the immense academic load [9,29]. The current study has confirmed that a significant correlation exists between abnormal gastrointestinal movements and anxiety. A highly significant difference ($p=0.000$) was detected between anxiety and symptoms of IBS among the health care students investigated. These results are similar to those by Elhosseiny et al., who documented high rates of psychiatric comorbidity; including 32.9% anxiety and 26.1% depression, compared to 26.3% and 27.2% borderline anxiety and depression [9]. A study in Jeddah, reported similar results, of 40.1% and 41.9% morbid anxiety and morbid depression, compared to 29.5% and 31.5% borderline depression and no depression [15].

A statistically significant relationship between IBS and quality of life ($p=0.000$) was reported in the current study. The greatest impairment in quality of life was observed for the subscale of food avoidance followed by interference activity, sexual activity, dysphoria, healthy worry, social reaction, body image and relationships. These findings were similar to those from a study by Kopczyńska et al., in which the greatest impairments of similar magnitude were shown for food avoidance, dysphoria and interference activity [53]. Also, Drossman et al., found that in IBS the most impaired domains were food avoidance, dysphoria, interference activity [54].

Consequently, our study has shown that IBS contributes to the negative impact on QOL, specifically food avoidance and interference activity. This may cause student attention deficits in class, behavioral and emotional struggles, and low self-esteem. Unfortunately, mental health therapists/student counseling and nutritional programs are not available at universities in Saudi Arabia. It is therefore recommended that first and foremost, through government funding, a psychologist and/or life coach and nutritionist be present at the campus to help students manage their dietary habits and anxiety levels.

4. Conclusion

Undergraduate students, particularly those studying health care are likely to be subjected to substantial amounts of anxiety, a major contributing factor to the increased prevalence of IBS, and its' impact on quality of life. The present study shows that IBS is associated with anxiety levels which is connected to impaired patient quality of life, especially food avoidance and interference with daily activities. Assessment of psychosocial factors (anxiety) and health related QOL should be provided during patients' visits to outpatient clinics. Addressing the gastrointestinal symptoms alone may not improve QOL in IBS. Psychological and psychiatric treatment may contribute to the improved IBS and patient well-being. Also, raising awareness among students regarding IBS-related symptoms and factors leading to its development would probably play an important role in mitigating the impact of the disease on their quality of life.

Limitations of the Study

Gender differences in IBS symptoms were not thoroughly explored in this study, mainly because most participants were female, as evident in numerous previous IBS research, thus limiting gender comparisons. In addition, the specific types of surgeries associated with IBS symptoms were not explicitly assessed. However, existing data suggest that gynecological surgeries may trigger the development of the irritable bowel syndrome [55].

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