Original Article

The Prevalence and Risk Factors of Irritable Bowel Syndrome in Saudi Arabia in 2019

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Abstract

Background: Irritable bowel syndrome (IBS) is a common chronic functional gastrointestinal (GI) disorder. The aim of this study is to assess the prevalence of IBS and its risk factors among the general population of Saudi Arabia, as there is no previous study has done so. **Methods:** A cross-sectional study was carried out to evaluate the prevalence of IBS, IBS subtypes and IBS risk factors among the general population of Saudi Arabia from June 22 to November 30, 2019. A designed questionnaire that is based on ROME IV criteria and licensed from Rome Foundation was used. A total of 1,680 eligible individuals from different parts of Saudi Arabia took part in this national survey and were included in the statistical analysis. The statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS) program (version 22). **Results:** The prevalence of IBS in the study was 18.2%. IBS-M was the most common subtype among IBS patients (42.3%). Risk factors that are significantly associated with IBS were shown to be smoking habits, gastroesophageal reflux disease (GERD), food allergy, anxiety, psychological stress, family history of IBS, regular use of non-steroidal anti-inflammatory drugs (NSAIDs), history of infection before occurrence of symptoms and residence in the south of Saudi Arabia ($P < 0.05$*). **Conclusions:** IBS is prevalent in Saudi Arabia. The most common risk factor among IBS patients is a positive family history of IBS (80%). Raising public awareness and further prospective studies are both advocated and needed.

Keywords: *Anti-bacterial agents, body mass index, contraceptive agents, genetics*

Introduction

IBS is not an uncommon chronic functional GI disorder as it affects 9%-23% of the population globally.[1] It was estimated that one in every five individuals suffers from IBS during a lifetime.[2] Additionally, there is an increasing percent of patients seeking medical advice for their IBS symptoms, which is estimated to be approximately 12% of primary care clinic visitors. They represent the main group of patients in gastroenterology clinics.[3] However, a recent systematic review and meta-analysis found that IBS prevalence was 9.2% applying Rome III criteria and 3.8% applying Rome IV criteria.[4]

The pathophysiology of IBS is still inadequately understood and the etiology of IBS remains without confirmed known causes. Yet, some associated risk factors have been implicated on the pathogenesis of the disease.[5-7] A "biopsychosocial" model[8,9] has been introduced recently as an attempt to integrate and harmonize the different factors (genetic, environmental and psychological) that could act in a synergistic way to produce these symptoms.

The incidence of IBS was found to be the highest in the age group between 20 and 40 years .[10] Also, some reports suggested that the incidence of IBS is higher in females compared to males.[11-14] IBS can also be influenced by genetic implications, where family history can play a role in the development of IBS in up to 30% of the patients.[15,16]

Food allergies have also been correlated to the occurrence of IBS symptoms.[17,18] However, the correlation between smoking and IBS remains to be determined.[19] Additionally, psychological stress is a significant contributing factor for the occurrence of IBS.[20,21] Abuse in childhood or adulthood is evidenced now to be associated with IBS, although whether it is of etiological importance is controversial.[22] Anxiety and depression are also common in IBS.[4,23]

To the best of our knowledge, this is the first study to evaluate the prevalence and

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risk factors of IBS in Saudi Arabia. Therefore, the aim of the present study is to estimate the local prevalence of IBS in Saudi Arabia and to identify the risk factors of this syndrome.

Methods

Study design

A cross-sectional study to assess the prevalence of IBS and its risk factors among the communities of Saudi Arabia.

The minimum sample size that should be achieved is 384 subjects that represent Saudis who age 18 or older (13,815,725 million) with a confidence level (CL) of 95% and confidence interval (CI) of 5%. The samples of 1,680 individuals were collected randomly using a self-reporting questionnaire, during the period from June 22 to November 30, 2019. The questionnaire is based on ROME IV criteria and licensed from Rome Foundation.[24] The Research Ethics Committee of the Taif University (40360159) approved our study on April 30, 2019.

Data collection

A questionnaire was designed to collect the data and was shared as an online questionnaire through the social media applications such as Twitter, Facebook, Instagram, WhatsApp, and Telegram. The questionnaire collection was also conducted by trained medical students through interviews with the general population in the parks, malls and universities. We excluded all participants who were under 18 years old as the questionnaire was only for adults. The questionnaire consisted of the following:

1. Sociodemographic characteristics (age, gender, marital status, residence, education, occupation and body mass index, BMI)
2. Characteristics of medical, psychiatric and family history (blood groups, smoking habits, GERD, food allergy, depression, anxiety, psychological stress, history of emotional abuse, history of physical abuse, history of sexual abuse, family history of IBS, regular use of NSAIDs, pelvic surgery and using oral contraceptive pills)
3. A designed questionnaire for diagnosing IBS in adults based on ROME IV criteria that is licensed for the author from Rome Foundation
4. History of infection before occurrence of symptoms, and antibiotic use before occurrence of symptoms in IBS patients and in people with IBS-like symptoms.

Statistical analysis

All data were recorded in a validated and pre-designed excel sheet. Data were represented in terms of valid percentages and frequencies for categorical variables; mean ± standard deviation (SD) expresses continuous variables; and BMI was calculated and categorized. Data were analyzed using the SPSS program (version 22) to perform all statistical calculations. We used Chi-square and t tests to assess the association between IBS and potential risk factors. P values ≤0.05 were considered statistically significant. Potential risk factors for IBS with a P value ≤0.5 were subjected to a binary logistic regression analysis to consider multiplicity.

Ethical considerations

The Research Ethics Committee of the Taif University (40360159) approved our study. Consents of participants were obtained from them to be involved in this study. This study was conducted in compliance with the Declaration of Helsinki. All authors had access to the study data and reviewed and approved the final manuscript.

Results

Patients' demographics

This study included 1,680 participants, who had mean age 32.2 ± 12.3, with a minimum age of 18 years and a maximum age of 75 years. Sixty-four percent of the samples were of females, while 36% were males. As for the marital status, 50.3% of the responders were single, while 1.6% were widowed.

The place of residence was also evaluated. About 74.3% of the responders were from the western area in Saudi Arabia, while only 3.4% were from the northern area. As for education, only 0.6% of the participants were illiterate, while 79% of the participants had a university degree or higher. Furthermore, 0.9% were manual workers, while 38.6% were students. The mean and SD of BMI was 26 ± 6.1 kg/m^2 and most of the participants had normal BMI. All sociodemographic data are detailed in Table 1.

Prevalence of IBS, IBS subtypes and the risk factors of IBS

Based on the answers of the participants, it has been revealed that the prevalence of IBS in our research was 18.2% (n = 306). IBS-M was the most common subtype among IBS patients (42.3%), followed by IBS-C (27.2%), IBS-D (21.6%) and IBS-U (8.8%).

The risk factors of IBS

There was a significant association between IBS and the residence in the south of Saudi Arabia (P = 0.0001). There were no statistically significant association between IBS and the other sociodemographic characteristics (P > 0.05). IBS was significantly associated with smoking habits, GERD, food allergy, family history of IBS and regular use of NSAIDs (P < 0.05*) [Table 2]. In contrast, we did not find a significant association between ABO groups and IBS (P = 0.47), nor did we detect a significant association between history of pelvic surgery and IBS (P = 0.14). Using oral contraceptive pills (OCPs) in women was also not associated with IBS (P = 0.98). There was a significant association between IBS and the history of infection

Table 1: Sociodemographic Characteristics (*n*=1,680)

Variable	Number	%
Gender		
Male	604	36
Female	1076	64
Marital status		
Single	845	50.3
Married	764	45.5
Widow	27	1.6
Divorced	44	2.6
Residence		
Central	185	11
North	57	3.4
East	99	5.9
South	91	5.4
West	1248	74.3
Education		
Illiterate	11	0.6
Primary/Intermediate school	31	1.9
High school	312	18.5
University and above	1326	79
Occupation		
Manual worker	15	0.9
Student	649	38.6
Employee	601	35.8
Unemployed	96	5.7
Housewife	178	10.6
Retired	141	8.4
BMI		
Underweight	114	6.8
Normal	704	41.9
Overweight	505	30
Obese	357	21.3

BMI: Body mass index

before the appearance of IBS symptoms (P = 0.04). There was no statistically significant association between IBS and using antibiotics before the appearance of IBS symptoms (P = 0.89). Family history was the most common risk factor among IBS patients in our study (80%). To identify factors associated with IBS, multiple risk factors with a P value ≤0.05 in Table 2 were included in a stepwise binary logistic regression analysis. The statistically significant differences in the regression model between IBS and the potential risk factors are documented in Table 3. Anxiety was associated with IBS, whereas depression was not. We also noticed that psychological stress was associated with IBS, whereas all forms of abuse (emotional abuse, physical abuse and sexual abuse) were not [Table 3].

Discussion

Irritable bowel disease is a common disorder that reduces the quality of patient life.[7] Despite the studies on worldwide prevalence and etiology of IBS, there is not enough data on its prevalence and risk factors among the general population of Saudi Arabia.

The aim of the present work was to explore the prevalence and risk factors of IBS in Saudi Arabia. It was demonstrated that the prevalence of IBS in this study was 18.2% (applying Rome IV criteria), which is within the international prevalence for IBS.[1] However, this percentage is higher than the results of a recent systematic review and meta-analysis from 34 countries that comprised 82,476 individuals (3,8%).[4]

Consistent with a recent study that was conducted by Alharbi *et al*.,[25] which investigated the prevalence of IBS and the most common subtypes among the northern Saudi population employing Rome IV criteria, we found that the most common subtype is IBS-M followed by IBS-C, -D and -U. However, Alharbi *et al*.[25] did not clearly address IBS-U prevalence in their study, which we found to be 8.8% in our study. Yet, the present study used a larger sample size and included all parts of Saudi Arabia, which strengthened its findings. This study also revealed that IBS was significantly associated with the population in the south of Saudi Arabia.

Consistent with a previous meta-analysis,[26] we did not detect a statistically significant association between age and IBS.

We did not find the prevalence of IBS to be significantly higher in women than in men. This result is consistent with a previous systematic review and meta-analysis that was conducted on 56 studies containing 1,88,229 eligible subjects.[27]

There was no statistically significant association between marital status and IBS, which is consistent with a previous study that included 1,082 individuals in a university-based population.[28] This result contrasts other studies. However, these studies are conflicting as to whether IBS is more common in married[29] or unmarried people.[30]

In contrast to the other studies, education level was not significantly associated with IBS; however, these studies are also conflicting if education is directly[31] or inversely[30,32] proportional to IBS.

Contrary to previous studies,[31-33] we did not find employment to be associated with IBS.

Regarding controversies about marital status, education levels and employment; and whether they are risk factors or not, we attributed those differences to cultural differences in each community's view on different social status. This status may be variably associated to individuals of those communities with psychological factors, such as anxiety and psychological stress, which are risk factors for IBS in themselves.

Table 2: Association of IBS with Characteristics (*n*=1,680)

Item	True IBS (*n*=306)		No IBS (*n*=1374)		*P*
	n	%	*n*	%	
Age (mean±SD)	31.4	11.5	32.4	12.5	0.18
Gender					
Male	107	35	497	36.2	0.7
Female	199	65	877	63.8	
Marital status					
Single	156	51	689	50.1	0.22
Married	131	42.8	633	46.1	
Widow	6	2	21	1.5	
Divorced	13	4.2	31	2.3	
Residence					
Central	48	15.7	137	10	0.0001
North	9	3	48	3.5	
East	23	7.5	76	5.5	
South	28	9.1	63	4.6	
West	198	64.7	1050	76.4	
Education					
Illiterate	1	0.3	10	0.7	0.7
Primary/Intermediate school	4	1.3	27	2	
High school	55	18	257	18.7	
University and above	246	80.4	1080	78.6	
Occupation					
Manual worker	1	0.3	14	1	0.38
Student	106	34.6	543	39.5	
Employee	116	37.9	485	35.3	
Unemployed	29	9.5	67	4.9	
Housewife	34	11.1	144	10.5	
Retired	20	6.5	121	8.8	
BMI groups					
Underweight	26	8.5	88	6.4	0.7
Normal	130	42.5	574	41.8	
Overweight	78	25.5	427	31.1	
Obese	72	23.5	285	20.7	
Blood group					
A+	84	27.4	306	22.7	0.47
A−	4	1.3	24	1.7	
B+	53	17.3	206	15	
B−	5	1.6	23	1.7	
O+	104	34	519	37.8	
O−	12	3.9	76	5.5	
AB+	15	4.9	67	4.9	
AB−	3	1	8	0.6	
Unknown	26	8.5	145	10.5	
Smoking					
Yes	84	72.55	262	19.1	0.001
No	222	27.45	1112	80.9	

Contd...

Table 2: Contd...

Item	True IBS (*n*=306)		No IBS (*n*=1374)		*P*
	n	%	*n*	%	
GERD					
Yes	110	36	254	18.5	0.0001
No	196	64	1120	81.5	
Food allergies					0.0001
Yes	95	31	277	20.2	
No	211	69	1097	79.8	
Depression					0.0001
Yes	85	27.8	149	10.8	
No	221	72.2	1225	89.2	
Anxiety					0.0001
Yes	192	62.75	445	32.4	
No	114	37.25	929	67.6	
Psychological stress					0.0001
Yes	209	68.3	536	39	
No	97	31.7	838	61	
Emotional abuse					0.0001
Yes	139	54.6	397	28.9	
No	167	45.4	977	71.1	
Physical abuse					0.0001
Yes	53	17.3	117	8.5	
No	253	82.7	1257	91.5	
Sexual abuse					0.01
Yes	29	9.5	77	5.6	
No	277	90.5	1297	94.4	
Family history					
Positive	245	80	825	60	0.00001
Negative	61	20	549	40	
Regular use of NSAIDs					0.0001
Yes	78	25.5	191	13.9	
No	228	74.5	1183	86.1	
Pelvic surgeries					
Yes	48	15.7	171	12.45	0.14
No	258	84.3	1203	87.55	
Using OCPs					
Yes	25	12.7	109	12.6	0.98
No	173	87.3	757	87.4	
Infection before symptoms appear					
Yes	28	9.2	56	5.9	0.04
No	276	90.8	900	94.1	
Using antibiotics					
Yes	31	10.2	95	9.9	0.89
No	274	89.8	865	90.1	

BMI: Body mass index; GERD: Gastroesophageal reflux disease; NSAIDs: Non-steroidal anti-inflammatory drugs; OCPs: Oral contraceptive pills

In contrast to previous studies,[32,34] the present work did not show a significant association between IBS and BMI, which is consistent with another study that was conducted on 1,978 individuals.[35] Studies that found BMI associated with IBS are conflicting as to whether IBS increases with increasing or decreasing BMI. We agree with Pickett-Blakely *et al*.[36] that understanding the mechanisms whereby obesity is linked to IBS symptoms, understanding

Table 3: Binary logistic regression analysis of characteristics associated with IBS (*n*=1,680)

Item	*P*	OR	95% CI	
			Lower	Upper
Residence	0.016*	1.849	1.120	3.053
Smoking	0.005*	0.640	0.468	0.874
GERD	0.001*	0.614	0.458	0.823
Food allergy	0.014*	0.686	0.508	0.925
Depression	0.173	0.775	0.537	1.118
Anxiety	0.000*	0.522	0.379	0.720
Psychological abuse	0.970	1.006	0.727	1.393
Physical abuse	0.385	0.822	0.529	1.278
Sexual abuse	0.995	1.002	0.591	1.697
Psychological stress	0.000*	0.540	0.392	0.745
Family history	0.000*	0.471	0.342	0.649
NSAIDs	0.007*	0.638	0.461	0.883

GERD: Gastroesophageal reflux disease; NSAIDs: Non-steroidal anti-inflammatory drugs

the clinical course of IBS in obese persons, and determining the effect of weight loss interventions on IBS symptoms can help in determining the correlation between IBS and BMI although his speech was confined to obesity.

In our research, there was a significant difference in IBS prevalence between smokers and non-smokers. A systematic review that included 33 articles comparing smoking prevalence between subjects with IBS and those without concluded that the association between smoking and IBS remains to be determined.[19]

IBS was associated with GERD, a finding that is in line with the previous studies.[37,38] However, this finding does not indicate the causal direction of the observed associations, which is outside the area of the present work.

Food allergy was also associated with IBS, which is consistent with the previous studies.[17,18]

In agreement with the previous results,[4,23] this study revealed that anxiety was associated with IBS. However, after applying a binary logistic regression, depression was not associated with IBS.

In the literature, the association between IBS and emotional and physical abuse is less distinct than the association between IBS and sexual abuse.[39] In our study, all forms of abuse (sexual, emotional and physical) were not associated with IBS in the logistic regression model.

As other studies have shown,[20,21] the present study has also shown that psychological stress was associated with IBS.

A significant difference was observed in IBS prevalence between subjects with positive family history of IBS and those without, which is consistent with the other studies.[15,16]

In contrast to the other studies,[35,40] this study showed that regular use of NSAIDs was significantly higher in IBS patients. In a case-control study, Keszthelyi *et al*. found that NSAIDs were more frequently used in IBS patients compared to controls.[41] Although NSAIDs are hypothesized to increase intestinal permeability in IBS patients, which allows luminal antigens to enter the lamina propria, thereby, eliciting an immune and inflammatory reaction,[42] further prospective cohort studies are needed to confirm NSAIDs as a risk factor for IBS and to help identify the etiological nature of this association.

There was no significant difference in IBS prevalence between patients with history of pelvic surgeries and patients without. Other studies have shown contrasting results from this study.[43,44] Further studies in which it is determined whether IBS is an effect for pelvic surgeries or whether pelvic surgeries are done mistakenly for misdiagnoses of IBS pain might solve this conflict. Other studies that determine mistaken pelvic surgeries owing to lower pain threshold in IBS patients could explain the different results between our study and other studies.

Our study did not find any significant association between IBS and oral contraceptive pills or antibiotic use before the occurrence of IBS symptoms. However, we observed a significant association between IBS and a history of infection before the symptoms occurred.

Conclusions

IBS is prevalent among the Saudi population. IBS-M was the most common subtype among IBS patients in Saudi Arabia. The contributing factors for IBS in Saudi Arabia were shown to be smoking habits, GERD, food allergy, anxiety, psychological stress, family history of IBS, regular use of NSAIDs, history of infection before occurrence of symptoms and residence in the south of Saudi Arabia.

Raising public awareness in the community about the risk factors for this common syndrome is advocated.

Further prospective studies are needed to determine the association of controversial risk factors with IBS.

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Conflicts of interest

There are no conflicts of interest.

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