Original Article

The prevalence of irritable bowel syndrome among Saudi population in Riyadh by use of Rome IV criteria and self-reported dietary restriction

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Abstract

Background: Irritable bowel syndrome (IBS) is the most prevalent functional gastrointestinal disorder. Diet may play a role in triggering the symptoms. We aimed to measure the prevalence of IBS and its types, and its association with food restrictions among the Saudi population, using the Rome IV criteria.

Methods: A cross-sectional study was conducted in the outpatient clinics of three major hospitals in Riyadh in conjunction with an electronic survey which was shared on social media. A total of 1,319 subjects (706 males and 613 females) completed a questionnaire of four domains (sociodemography, Rome IV, food restriction, and herbs) between Nov 2019 and February 2020. Convenience sampling was used.

Results: IBS was diagnosed in 104 subjects (7.9%) and, of these, 52% were IBS-M (mixed) type. The prevalence was higher in women than in men (4.9% vs. 3.0%; $P = 0.006$). A significant association was found between the presence of IBS symptoms and low income ($P = 0.010$), and not working ($P < 0.0001$). Most of the IBS patients showed food restriction related to milk ($P < 0.0001$) and legumes ($P = 0.0029$), besides other types of food and drinks.

Conclusions: IBS is less common among the Saudi population. A female gender, low family income, and working status, have the highest association with IBS. The foods most often restricted were legumes and milk. Future community studies may present an opportunity to relate with cultural differences and food preferences.

Keywords: IBS, prevalence and food restriction, Rome IV

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INTRODUCTION

Irritable bowel syndrome (IBS) is a functional gastrointestinal disorder illustrated by long-standing abdominal pain with a change in bowel habits, in the absence of any organic cause.[1,2] Even though functional gastrointestinal disorders are seen often in developed countries,[3] IBS is the most recognized cause for visiting a gastroenterologist.[4] IBS can affect a wide scope of ages and economic, social, and ethnic backgrounds.[5-7] As such it creates a great cost burden for

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both the patient and the caregivers.[8-10] The gradual change in the epidemiology of diseases is a phenomenon that is being observed globally. Many diagnostic criteria for IBS have been proposed.[11] Therefore, these variations in the diagnostic criteria affect the prevalence significantly from one country to another.[12] Moreover, there are no definite diagnostic investigations or biomarkers and the diagnosis is usually made clinically by symptoms-based criteria.[13] The worldwide prevalence of IBS is 11.2% and it is more common under 50 years of age, with a significant female predominance.[14] A review of the literature has shown an increase in the prevalence; ranging from 8.9 to 31.8% in the Arab World. In particular, the prevalence in the recent decade has risen considerably in Saudi Arabia.[15]

The etiology of IBS is not clear and is complex. The factors can be either personal, gender, age, and psychological characteristics, or environmental such as stress, social and economic factors, antibiotics, and food. Individuals therefore attempt dietary modifications on their own and exclude foods to manage their symptoms.[16]

The dietary pattern differs among different countries and ethnicities and can influence the prevalence of the symptoms of IBS, but the available information is scarce.[17]

There is a lack of scientific evidence supporting the importance of different ingredients of meals for symptom generation in IBS and has led to the adoption of new diets. Studies have shown that people with lower gastrointestinal symptoms are often advised to follow a strict diet and it is used as a treatment option.[18]

Most of the IBS patients feel that their symptoms impute nourishment sensitivity.[19] Therefore, dietary alteration is progressively used to manage the symptoms of IBS.[20] One study found that 62% of the IBS patients had either restricted or prohibited certain food items from their everyday diet, and of these, 12% were in danger of long-standing dietary insufficiencies.[21] Meanwhile, for a long period, people with lower gastrointestinal symptoms have been advised to follow a strict diet.[22] Studies have shown that herbs and spices have health benefits and there is evidence of peppermint oil for the treatment of functional gastrointestinal disorders in children,[23] and spices for multiple ailments including functional abdominal pain disorders.[24] Ginger has been found to be effective in reducing pain in gut motility and stool changes in diarrhea-predominant IBS.[25-27]

IBS is burdensome and should not be neglected. It greatly affects a patient's daily life and social functioning. It hinders their concentration, energy, vitality, and self-confidence, and has a substantial negative impact on the quality of life.[28,29] A literature search found that most of the studies investigating the association between IBS and food have been conducted in the West. We found limited research in terms of occurrence and the association between IBS and food in the Arab countries, which in turn have different dietary behavior from those of the Western countries.

SUBJECTS AND METHODS

In this cross-sectional descriptive study, we targeted patients attending the outpatient clinics of three major hospitals: King Saud University Medical City, King Abdulaziz University Hospital, and the King Abdulaziz Medical City in Riyadh, Saudi Arabia, between November 2019 and February 2020, in conjunction with an electronic survey which was shared on social media. The current study was approved by the Institutional Review Board of the College of Medicine; King Saud University (reference no. E 20 4854), dated 17.12.2019.

The target population was Saudi men and women (age ≥18 years) attending the outpatient clinics, in addition to the individuals using social media, where we uploaded a link of the electronic survey on Twitter which included the consent, aim of the study, and the questionnaire in Arabic on Google Form.

The Good Calculators website was used to estimate the required sample size using the formula: $N = (Z)2P(1\text{-}P)/D2$, based on the previous study findings,[8] which indicated that the prevalence of IBS in Saudi Arabia was 21%. We estimated the sample with the following assumption: Prevalence (P) of IBS is 20% with a confidence level of 95% ($Z = 1.96$) and a margin of error (D) of 3% (0.03); the required sample size was estimated to be at least 683 individuals. Adding a 15% expected nonresponse or incomplete data, the total sample size was estimated to be at least 786 individuals. A convenience sampling technique was used to approach the participants.

A validated questionnaire using the Rome IV criteria was used along with the demographic questionnaire. The questionnaire included four domains (sociodemographic, the Rome IV criteria, questions on food restriction, and knowledge of some herbs that could alleviate the symptoms of IBS). Participation was voluntary. In addition to that we conducted an electronic survey using the same questionnaire as a soft copy, which was shared on social media over the same period.

This inventory is a self-reported instrument for the diagnosis of IBS using ROME IV. The Rome IV Diagnostic Questionnaire (R4DQ) for adults is a relevant instrument with broad applicability for research and clinical practice worldwide. It was selected because of its wide use and its adequate sensitivity of 62.7% and excellent specificity of 97.1% for the diagnosis of IBS.

The R4DQ is understandable by 90% of the patients, and diagnoses based on the questionnaire show good test-retest reliability. The Diagnostic Questionnaire is also translatable to other languages while maintaining conceptual equivalence and achieving cultural appropriateness. It has three diagnostic items.[30] The first is includes recurrent abdominal pain at least once a day per week in the last 3 months. The second, pain associated with defecation, change in frequency, and change of form/appearance of stool. At least two of those three must be answered three times or more. The third category that must be fulfilled is the onset of symptoms, which must be 6 months prior to the diagnosis. Any participant who fulfilled the criteria above was labeled as an IBS patient. By using the Rome IV questionnaire, IBS is divided into subtypes according to the stool type. The subtypes are based on the patient's perception of his/her predominant type of abnormal stool consistency (using the Bristol Stool Form Scale), which can evaluate feces based on the shape and consistency of the stool, A number from 1 to 7 was chosen according to the abnormal texture of the stool and the participant could choose the type related to him or her. The scale classified them accordingly as follows: IBS-C (predominant constipation [types 1–2]), IBS-D (predominant diarrhea [types 6–7]), IBS-M (usually mixed with at least one-fourth for each). IBS-U (un-subtyped: patients meet diagnostic criteria for IBS but there is insufficient abnormality of stool consistency and cannot be accurately categorized in any of the above subtypes).

Data were analyzed using the SPSS Pc+ version 21.0 statistical software. Descriptive statistics (mean, standard deviation, frequencies, and percentages) were used to describe the quantitative and categorical variables. The Chi-square test was used to observe the association between the categorical study and outcome variables. A *P* value of <0.05 was used to report the statistical significance of the estimates.

RESULTS

Characteristics of the study population

A total of 1,500 questionnaires were collected. Valid responses were obtained from 1,319 participants, with a response rate of 87.9%, where 391 questionnaires were obtained from the participants visiting hospitals and 928 questionnaires were obtained from the participants on social media; 706 (53.5%) were males and 613 (46.5%) were females. About 697 (52.8%) participants were of 18–30 years of age followed by 249 (18.9%) in the 31–40 years age group, 230 (17.4%) in the 41–50 years age group, 108 (8.2%) in the 51–60 years age group and only 35 (2.7%) participants aged 60 years or more. The majority of the sample [914 patients (69.3%)], had a university degree or higher 357 (27.1%) completed high school, 40 (3%) intermediate school, 4 (0.3%) primary school, and 1 (0.1%) was uneducated. Furthermore, nearly half of the participants, 664 (50.3%) were single, 697 (52.8%) had low monthly income, and 612 (46%) were unemployed [Table 1].

Prevalence and types of IBS

The prevalence among the patients who reported having IBS symptoms was 26%. Of the 26% who claimed to have been diagnosed with IBS, only 7.9% met the Rome IV criteria. The IBS prevalence rates in the males and females was 39 (3.0%) and 65 (4.9%) respectively ($P = 0.006$).

The prevalence rate of IBS was numerically the highest among the younger participants (59.6%) followed by 31–40 years (16.3%), 41–50 years (18.3%), 51–60 years (3.8%), and was the lowest among 60 years and above (1.9%) [Table 1]. The difference between the age groups was insignificant ($P = 0.196$). The most common IBS type was IBS-M, followed by constipation, and diarrhea, constituting 54 (52%), 25 (24%), and 25 (24%), respectively ($P < 0.001$) [Table 2].

The association between marital status and IBS was not significant ($P = 0.076$). A significant difference was observed with respect to the job status ($P = 0.002$), income ($P = 0.010$), and IBS symptoms of the respondents. Higher education was related to the presence of IBS, although not statistically significant [Table 1].

Knowledge of herbs and food restriction among the participants

Since IBS may affect dietary preferences, as an initial step, we evaluated the relationships between food avoidance and IBS symptoms. The IBS patients were more likely to avoid food compared to non-IBS.

The study participants with IBS reported lower consumption and restricted food such as legumes (65.4%, $P = 0.000$), milk (54.8%, $P = 0.001$), fatty food (46.2%, $P = 0.05$), cauliflower (36.5%, $P = 0.001$), cabbage (34.6%, $P = 0.003$), milk products (27.8%, $P = 0.027$), coffee (25%,

Table 1: Prevalence of IBS according to the sociodemography of the participants

Category	No IBS (n = 1,215)	IBS (n = 104)	Total	Chi-square value	*P*
Age					
18-30	635 (44.1%)	62 (4.7%)	697 (50.4%)	4.235	0.375
31-40	232 (17.6%)	17 (1.3%)	249 (18.9%)		
41-50	211 (16.0%)	19 (1.4%)	230 (17.4%)		
51-60	104 (7.9%)	4 (0.3%)	108 (8.2%)		
More than 60	33 (2.5%)	2 (0.2%)	35 (2.7%)		
Gender					
Male	667 (50.6%)	39 (3.0%)	706 (53.5%)	11.656	0.001
Female	548 (41.5%)	65 (4.9%)	613 (46.5%)		
Marital status					
Single	623 (47.2%)	41 (3.1%)	664 (50.3%)	6.875	0.076
Married	563 (42.7%)	59 (4.5%)	622 (47.2%)		
Divorced	24 (1.8%)	4 (3%)	28 (2.1%)		
Widower	5 (4%)	0 (0%)	5 (4%)		
Educational level					
Uneducated	1 (1%)	0 (0.0%)	1 (1%)	3.442	0.487
Primary school	4 (3%)	0 (0.0%)	4 (3%)		
Intermediate school	38 (2.9%)	3 (0.2%)	40 (3%)		
High school	338 (25.6%)	21 (1.6%)	357 (27.1%)		
University/Higher education	834 (63.2%)	80 (6.1%)	846 (64.3%)		
Job status					
Government sector	423 (32.1%)	18 (1.4%)	441 (33.4%)	17.210	0.002
Private sector	112 (8.5%)	14 (1.1%)	126 (9.6%)		
Self-employed	40 (3.0%)	3 (0.2%)	43 (3.3%)		
Retired	92 (7.0%)	5 (0.4%)	94 (7.4%)		
Not working	548 (41.5%)	64 (4.9%)	612 (46.4%)		
Income					
<5,000 Riyals	629 (51.8%)	68 (65.4%)	697 (52.8%)	9.296	0.010
5,000-10,000 Riyals	264 (21.7%)	11 (10.6%)	275 (20.9%)		
>10,000 Riyals	322 (26.5%)	25 (24.0%)	347 (26.3%)		

$P = 0.03$), tea (23.0%, $P = 0.02$), and spicy food (12.5%, $P = 0.02$). Soft drinks and fried food were not significantly associated [Table 3].

The study compared the knowledge of the participants about the use of some herbal drinks (mint, ginger, and chamomile) as pain relievers. The study revealed that the overall level of knowledge among the IBS patients was less as compared to their counterparts, and it was not statistically significant for all [Table 4]. A significant association (X 2 =36.027, $P = 0.000$) was found between the outpatients and social media population and the presence of IBS [Table 5].

DISCUSSION

In this cross-sectional study, we investigated the prevalence of IBS and its association with food restrictions in an adult population. In the current study, only 7.9% met the Rome IV criteria which is lower than a previous survey conducted among adults in Saudi Arabia and found a prevalence of 16.3% using the Rome IV criteria but of a different target population.[31]

Further, significant associations between IBS and dietary restrictions were observed. The two other studies conducted among the medical students in Saudi Arabia using the Rome III criteria found a prevalence of 21.1 and 31.3%.[8,32] A higher prevalence compared to our study could be due to the different target groups. The global prevalence of IBS was estimated to be 11.2%[33] and the results of the present study are close to the reported literature.

A systematic review of 53 studies involving patients from 38 countries that used the Rome III criteria revealed a pooled prevalence of 9·2%[28] which is similar to our findings. Another study in Iran reported a much lower prevalence of 1.1% using the Rome III criteria.[1]

A possible explanation for the varied results could be that the Eastern countries have used the Western criteria

Table 2: The prevalence of constipation, diarrhea, and mixed constipation and diarrhea among IBS and non-IBS persons

Type	No IBS*(n = 731)	IBS (n = 104)	Chi-square value	*P*
Constipation (IBS-C)	210 (28.72%)	25 (24.0%)	34.580	0.000
Diarrhea (IBS-D)	138 (18.87%)	25 (24.0%)		
Mixed constipation and diarrhea (IBS-M)	186 (25.4%)	48 (46.6%)		
Not applicable (IBS-U)	197 (26.9%)	5 (4.9%)		

*Functional disease patients

Table 3: Food restriction as compared between IBS and non-IBS persons

Type of food	No IBS (Total 1,215)	IBS (Total 104)	Chi-square value	*P*
Milk	321 (26.4%)	57 (54.8%)	37.599	0.0001
Milk products	226 (18.6%)	29 (27.9%)	4.872	0.027
Legumes	562 (46.25%)	68 (65.4%)	14.051	0.000
Cabbage	279 (23.0%)	38 (36.5%)	8.739	0.003
Cauliflower	259 (21.3%)	36 (34.6%)	10.803	0.001
Fatty food	433 (35.6%)	48 (46.2%)	3.824	0.051
Tea	174 (14.3%)	24 (23.1%)	5.049	0.025
Coffee	196 (16.13%)	26 (25%)	4.736	0.030
Soft drinks	563 (46.3%)	54 (51.9%)	0.682	0.409
Citrus food	237 (19.5%)	31 (29.8%)	5.411	0.020
Fried food	56 (4.6%)	8 (7.7%)	1.973	0.160
Spicy food	79 (6.5%)	13 (12.5%)	5.312	0.021
Sweet food	29 (2.38%)	3 (2.9%)	0.100	0.751
Fast food	18 (1.48%)	4 (3.8%)	3.266	0.071
White bread	17 (1.39%)	2 (1.9%)	0.185	0.667
Eggs	6 (0.49%)	0 (0%)	0.516	0.473
Other foods	64 (5.26%)	5 (7.2%)	0.041	0.840

for diagnosing IBS, which are not authenticated for the culture and language of the country they were used in. Other reasons important for these inconsistencies could be the use of different sets of criteria, small target population size, and racial differences.[1] Locally, there are no population-based studies to be used as a reference point for comparison.

The prevalence of IBS varies by sociodemographic factors, gender, and age. The reported sex and age differential among those with IBS was consistent with the results reported in the literature worldwide[6,28] and locally,[8,32] having predominance in females.

IBS is more prevalent among adolescents and declines with age. The present study findings are in line with the reported literature[34] and most of the IBS patients were young and within the age group of 1—30. Psychological and social factors such as stress, anxiety, stressful challenging education may play a role in higher IBS prevalence among the young generation.[35]

IBS has a diverse distribution with respect to socioeconomic status. Many studies have shown that IBS is associated with a lower socioeconomic status (SES),[36] while others believed that IBS is the disease of high socioeconomic classes.[37] In our study, we found that IBS was significantly associated with low income.

In the principles of occupational hygiene, the recognition and/or identification of occupational health hazards is important. Usually, recognition means the correlation between cause and effect. IBS has also induced an occupational hazard. The question arises as to whether low income causes IBS, or IBS causes work absenteeism and reduced productivity leading to low SES. This phenomenon needs further exploration.

The prevalence of IBS was numerically higher in the unmarried population than in their married counterparts. This finding is consistent with the results of other studies,[1,38-40] although our findings did not reach statistical significance.

According to some studies,[38,40] IBS has an inverse relationship with education. Contrary to this, we observed the opposite and our results found the educational level to be an important contributor for IBS. The prevalence was higher in people with higher education. This finding is close to the results of studies from Egypt and Iran that showed IBS to be more prevalent among moderately educated individuals.[12,41]

An explanation for this could be the similar cultural background that the countries share. Physical and psychological stress is considered a vital factor to IBS etiology. The relationship between higher education level and IBS could be explained by the fact that first, these individuals are likely to be under a lot of stress due to the tremendous academic load during their studies, then, the

Table 4: Knowledge among IBS and non-IBS patients regarding some drinks that have a role in pain relief

Drink	Yes		No		I do not know		Chi-square value	*P*
	No IBS	IBS	No IBS	IBS	No IBS	IBS		
Mint	642 (48.7%)	49 (3.7%)	110 (8.3%)	19 (1.4%)	463 (35.1%)	36 (2.7%)	9.227	0.009
Ginger	379 (28.7%)	24 (1.8%)	275 (20.8%)	26 (2%)	561 (42.5%)	54 (4.1%)	2.980	0.225
Chamomile	640 (48.5%)	54 (4.1%)	74 (5.6%)	8 (0.6%)	501 (38%)	42 (3.2%)	0.422	0.810

Table 5: Association between prevalence of IBS symptoms versus outpatients and social media population

Type	No IBS (Total 1,215)	IBS (Total 104)	Chi-square value	*P*
Outpatients (391)	387 (99%)	4 (1%)	36.027	*P*<0.000
Social media patients (928)	828 (89.2%)	100 (10.8%)		

number of suitable occupations for the highly educated people is less, which, therefore, requires more effort from them to find a suitable job, which can lead to further stress and anxiety, which is known to be associated with IBS.

IBS is clinically a heterogeneous syndrome, which can be further classified into more specific diagnoses which include IBS-D, IBS-C, and IBS-M. The prevalence differs according to regions. The majority of previous studies have found IBS-M to be the most common subgroup. In line with the majority of the previous studies, we also found IBS-M to be the most common subgroup using the Rome IV criteria.[12,28]

Food is a well-known factor that stimulates the IBS symptoms, with almost 63–90% of the patients reporting their symptom generation related to food.[42]

Many studies indicated that IBS symptoms are worsened and aggravated by certain foods, such as legumes, milk, spicy food, fried food, and coffee.[3,19,43,44] Among the study subjects, the majority of the IBS patients reported food restriction due to intolerance. High-fat, high FODMAPs which are fermentable oligosaccharides, disaccharides, monosaccharides, and short chain polysaccharides that are poorly absorbed in small intestine and are prone to absorb water and ferment in the colon, like legumes, cabbage, cauliflower and citrus fruits, milk and milk products were considered by many IBS patients to induce their gastrointestinal symptoms, hence, restricted them from their diet, as compared to healthy individuals. These features of self-reported food restriction among the Saudi IBS patients are comparable to those reported in the other studies.[45,46] In the present study, legumes were the most problematic food item reported by the IBS patients and 65% of the IBS patients reported symptoms related to it, and therefore, avoided it in their diets. This proportion is comparable to the ones reported in previous studies.[47] Although there is increasing evidence supporting the use of low-FODMAP diets as an IBS treatment, the diet usually consumed in the Arab region includes dates, honey, cheese, hummus, beans, falafel, bread, and black and herbal teas which is a high FODMAP diet. Our findings may provide a clue for the healthcare professionals to plan and implement awareness and teaching sessions for IBS patients on a low-FODMAP diet and food planning. Further studies are warranted to elucidate the FODMAP composition of the frequently consumed food items.[16]IBS patients were more likely to restrict tea and coffee compared to the non-IBS, which is contrary to a previous study.[3] Apart from the diet and lifestyle changes, IBS patients usually adopt some alternative strategies such as the use of herbal supplements like peppermint to relieve pain and associated symptoms,[48,49] either as a single herb or in combination products. A few clinical trials are done, but in general, the current knowledge remains limited on this topic, especially from a patient's knowledge perspective.[50]

CONCLUSION

In the present study, IBS is less common among the Saudi population as compared to the worldwide prevalence rates. Female gender, higher education level, low family income, and working status, have the highest association with IBS symptoms. Culture can play an important role as it affects an individual's health beliefs, diet, psychological factors, and gender differences. Future larger multicenter studies are needed to further explore the knowledge of these cross-cultural and psychological aspects for undertaking a holistic approach, and recommend dietary options for the management of IBS patients. A collective team effort, a strong physician–patient relationship, and health promotion programs that can address the above-mentioned areas are highly warranted.

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Conflicts of interest

There are no conflicts of interest.

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