

Research article

IBS common features among Northern Saudi population according to Rome IV criteria

Saleh Hadi Alharbi¹, Fahad A. Alateeq¹, Khalil Ibrahim Alshammari¹ and Hussain Gadelkarim Ahmed^{2,3,*}

¹ Faculty of Medicine, Al-Imam Mohammad Ibn Saud Islamic University, Riyadh, Kingdom of Saudi Arabia

² College of Medicine, University of Hail, Saudi Arabia

³ University of Khartoum, Sudan

* **Correspondence:** Email: hussaingad5@gmail.com.

Abstract: Background: Irritable Bowel Syndrome (IBS) is a global health disorder characterized heterogenic prevalence worldwide. Therefore, the aim of the present study was to identify the IBS common features among Northern Saudi population according to Rome IV criteria. Methodology: In this community based cross-sectional survey, data about IBS were obtained from 900 Saudi volunteers living in the city of Hail, Northern Saudi Arabia. A Purposeful questionnaire was designed and used for obtaining the necessary data. Each questionnaire was filled by a medical student during the interview. IBS was diagnosed based on Rome IV Criteria. Results: The most common IBS type was mixed followed by constipation and diarrheal, constituting 173/403 (43%), 125/403 (31%) and 105/403 (26%), respectively. The prevalence rates of mixed constipation and diarrheal IBS types among males were 43%, 31.6%, and 25.4%, respectively. The prevalence rates of mixed constipation and diarrheal IBS types among females were 43%, 30.6%, and 26.5%, respectively. Conclusion: The prevalence of rates of IBS using Rome IV, still within medium values among Northern Saudi population, though, there were higher prevalence rates of IBS symptoms. The most common IBS type was mixed followed by constipation and diarrheal types. All IBS related symptoms were more common among women compared to men.

Keywords: irritable bowel; symptoms; diarrhea; constipation; Saudi Arabia

1. Introduction

Irritable bowel syndrome (IBS) is a global health disorder, which is difficult to ascertain its global prevalence due to the heterogeneity of published epidemiological data. The mean prevalence among individual countries ranged from 1.1% in France and Iran to 35.5% in Mexico [1]. IBS is more prevalent among females than males, which is attributed to a diversity of physiological and psychological factors [2]. IBS is categorized according to the predominant symptoms (Rome IV criteria) into diarrheal IBS (IBS-D), constipation (IBS-C), and mixed IBS (both D&C) (IBS-M), or undetermined (IBS-U) [3]. IBS-C is significantly prevalent among females. Fatigue, depression, anxiety, and lower quality of life are more frequently among females compared to males' patients. These facts may indicate that sex hormones and gender inconsistencies may play vital roles in the pathophysiology of IBS [2,4].

Although there are few studies from Saudi Arabia, the existent studies showed relatively higher prevalence rates of IBS, particularly among the younger population. A prevalence of 9.2% was reported in patients with a mean age of 17.5 ± 3 years and a range of 15–23 years [5]. Prevalence of IBS was 14.4% was reported from Western Saudi Arabia [6].

The Rome diagnostic criteria are expert consensus criteria for diagnosing functional gastrointestinal disorders (FGIDs) [7]. The initial forms of Rome criterion regarded bowel disorders including IBS, functional constipation, diarrhea and distension as separate parts. Subsequently, these disorders were recognized as overlap (Rome II & Rome III). However, it is difficult to arrange these disorders in the clinic into separate entities. Such is the case of IBS with predominant constipation (IBS-C) from functional constipation or IBS-D from functional diarrhea. It is known that bloating and/or distension are shared symptoms repeatedly stated by patients with any functional bowel disorder [8]. Rome III was revised to Rome IV in May 2016. One important change in the Rome IV criteria is that abdominal pain must be present for a diagnosis of irritable bowel syndrome (IBS). Under Rome III, in contrast, patients with abdominal discomfort only could be diagnosed with IBS, but these cases under Rome IV are now classified as unspecified functional bowel disorder (FBD). In a simple comparison of Rome III and Rome IV, it is unclear whether this difference reflects the influence of symptomatic frequency or the presence of abdominal pain. In particular, the influence of abdominal pain restriction on the diagnosis of IBS with predominant constipation (IBS-C) in the Rome IV criteria is largely unknown [9].

However, the symptoms of IBS may differ in different geographical regions, as a result of underline etiological factors. Therefore, the aim of the present study was to identify the IBS common features among Northern Saudi population according to Rome IV criteria.

2. Materials and methods

In this community based cross-sectional survey, data about IBS were obtained from 900 Saudi volunteers living in the city of Hail, Northern Saudi Arabia. Participants were randomly selected by simple random regardless of age, gender, and education or occupation.

A Purposeful questionnaire was designed and used for obtaining the necessary data. Each questionnaire was filled by a medical student during the interview. IBS was diagnosed based on Rome IV Criteria. Recurrent abdominal pain, on average, at least 1 day/week in the last 3 months, associated with two or more of the following criteria:

Related to defecation; Associated with a change in frequency of stool; Associated with a change in form (appearance) of stool. Criteria fulfilled for the last 3 months with symptom onset at least 6 months before diagnosis. Those didn't completely fulfill Rome IV criteria were categorized as patients with IBS symptoms.

3. Data analysis

Statistical Package for Social Sciences (version 16) was used for analysis and to perform a Pearson Chi-square test for statistical significance (*P value*). The 95% confidence level and confidence intervals were used. A *p value* less than 0.05 was considered statistically significant.

4. Ethical consent

Each participant was asked to sign a written ethical consent during the questionnaire's interview. The informed ethical consent form was designed and approved by the ethical committee of the College of Medicine (University of Hail, Saudi Arabia) Research Board.

5. Results

Out of the 900 study subjects, 388 (43%) were males and 512 (57%) were females. The majority of participants were at age group ≤ 22 years ($n = 256$), particularly females ($n = 225$), followed by age range 23–29 years ($n = 196$), as shown in Table 1, Figure 1. Most of the participants were Governmental employed ($n = 297$), particularly females ($n = 260$), followed by self-employed ($n = 201$), particularly males ($n = 201$), as shown in Table 1, Figure 1. IBS was diagnosed in 106 (11.8%) patients applying Rome IV criteria (42/388 (10.8%) were males and 64/512 (12.5%) were females). Consequently, the overall prevalence of IBS was 11.8%, and the prevalence rates of males and females were 10.8% and 12.5%, respectively. IBS symptoms were identified in 297/900 (33%) subjects, (116/388 (30%) were males and 181/512 (35.4%) were females), as indicated in Table 1, Figure 2.

The most common IBS type was mixed followed by constipation and diarrheal, constituting 173/403 (43%), 125/403 (31%) and 105/403 (26%), respectively. The prevalence rates of mixed constipation and diarrheal IBS types among males were 43%, 31.6%, and 25.4%, respectively. The prevalence rates of mixed constipation and diarrheal IBS types among females were 43%, 30.6%, and 26.5%, respectively, as indicated in Table 2, Figure 1.

Changes in stool frequency with discomfort were observed in 403/900 (44.8%) of whom 178/399 (44.6%) were males and 225/512 (44%) were females. Changes in stool appearance were noted in 403/900 (44.8%) of whom 190/399 (47.6%) were males and 213/512 (41.6%) were females. Nocturnal diarrhea was identified in 282/900 (31.3%) of the patients (97/399 (24.3%) were males and 185/512 (36%) were females). Hematochezia was experienced in 62/900 (6.9%); included 24/399 (6%) males and 40/512 (7.8%) females. Severe diarrhea or constipation was determined in 110/900 (12.2%) of whom 37/399 (9.3%) were males and 73/512 (14.3%) were females. Fever or weight loss was described by 170/900 (19%) of the patients of whom 55/399 (13.8%) were males and 115/512 (22.5%) were females, as shown in Table 2, Figure 2.

Table 1. Study subjects by gender, age and occupation and IBS status.

Variable	Males	Females	Total
Age			
≤22 years	31	225	256
23-29	68	128	196
30-39	78	63	141
40-49	97	54	151
≥50	114	42	156
Total	388	512	900
Occupation			
Jobless	55	113	168
Private Employer	50	33	83
Self-employed	201	96	297
Governmental employment	52	260	312
Student	30	10	40
Total	388	512	900
IBS status			
IBS(Rome IV)	42	64	106
IBS symptoms	116	181	297

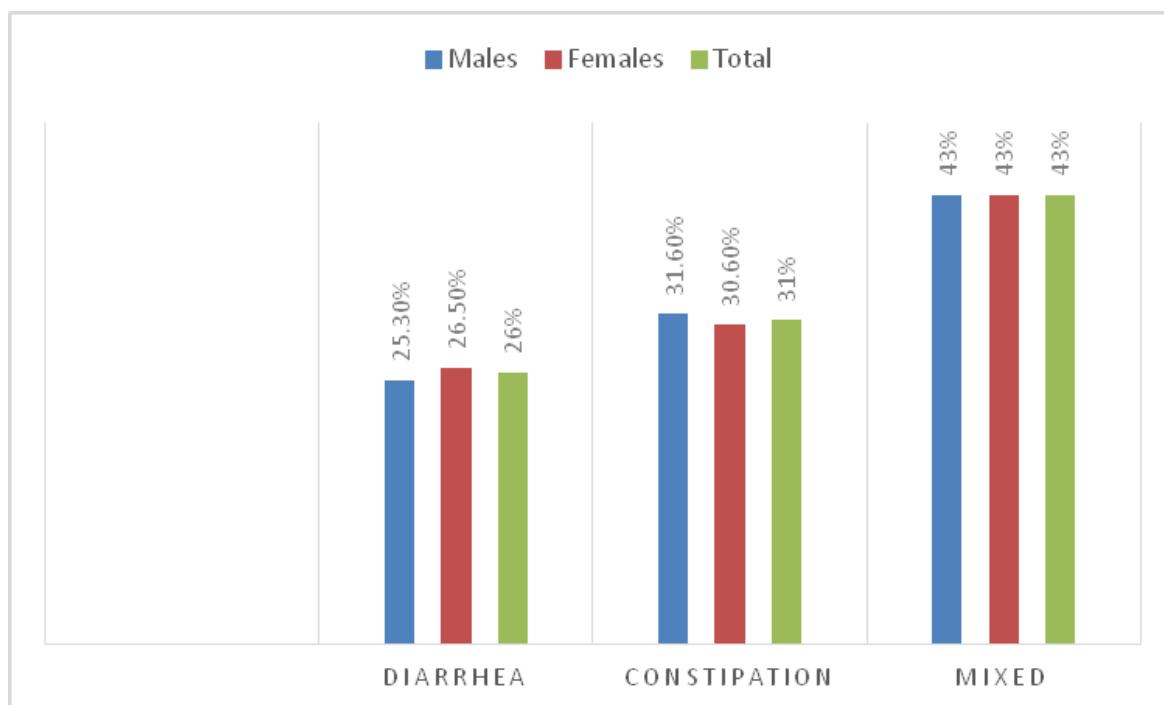
**Figure 1.** IBS symptoms by gender.

Table 2. Study subjects by gender and IBS symptoms.

Variable	Males	Females	Total
Dominant symptoms			
Diarrhea	40	65	105
Constipation	50	75	125
Mixed	68	105	173
Total	158	245	403
<i>Change in stool frequency with discomfort</i>			
Yes	178	225	403
No	210	287	497
Total	388	512	900
<i>Changes in Stool Appearance</i>			
Yes	190	213	403
No	196	299	497
Total	388	512	900
<i>Nocturnal diarrhea</i>			
Yes	97	185	282
No	291	327	618
<i>Severe Diarrhea or Constipation</i>			
Yes	37	73	110
No	351	439	790
<i>Hematochezia</i>			
Yes	24	40	62
No	364	472	836
<i>Fever</i>			
Yes	55	115	170
No	333	397	730
<i>Weight loss</i>			
yes	55	115	170
No	33	397	730

Table 3, Figures 3 and 4, summarized the distribution of the study population by age and IBS symptoms. Diarrhea was commonly observed in age 40–49 years followed by 30–39 years, representing 36/105 (34.3%) and 26/105 (24.8%), correspondingly. Constipation was predominantly determined in age groups 40–49 and 30–39 years, constituting 40/125 (32%) and 37/125 (29.6%), in this order. Mixed (Diarrhea and Constipation) was commonly observed in 40–49 years and 30–39 years, representing 47/173 (27%) and 45/173 (26%), in this order (Figure 3). Changes in stool frequency with discomfort mostly experienced in the age group ≤ 22 years, followed by 23–29 years, representing 110/403 (27.3%) and 100/403 (25%), correspondingly. Changes in Stool Appearance were predominantly seen in the age range 23–29 years, representing 109/403 (27%). Nocturnal diarrhea was predominantly seen in the age group ≤ 22 years, representing 98/403 (24.3%).

Severe diarrhea or constipation was more frequent in age 23–29 years, constituting 35/110 (31.8%). Hematochezia was more frequent in the age range 30–39 years, representing 18/64 (28%). Fever, was more frequent in the age range ≤ 22 years, representing 55/170 (32%).

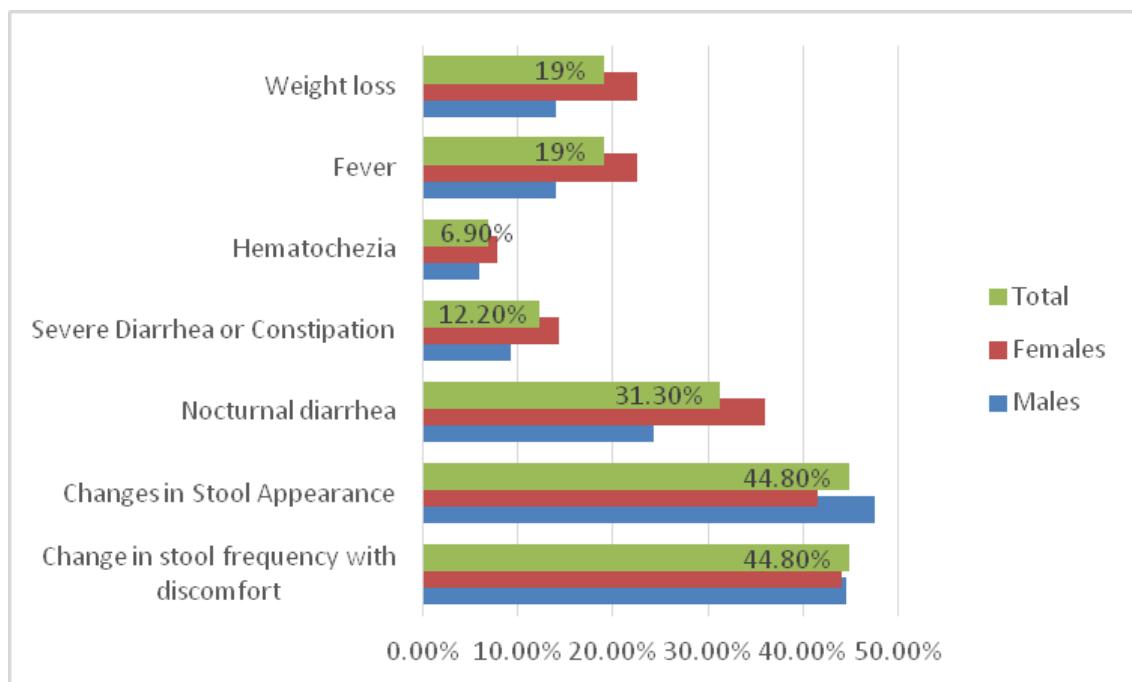


Figure 2. Description of IBS symptoms by gender.

Table 3. Study subjects by age and IBS symptoms.

Variable	<22 years	23–29	30–39	40–49	50+	Total
<i>Dominant symptoms</i>						
Diarrhea	12	14	26	36	17	105
Constipation	7	24	37	40	17	125
Mixed	19	37	45	47	25	173
Total	38	75	108	123	59	403
<i>Changes in stool frequency with discomfort</i>						
Yes	110	100	77	62	54	403
No	146	96	64	89	102	497
Total	256	196	141	151	156	900
<i>Changes in Stool Appearance</i>						
Yes	92	109	83	59	60	403
No	164	87	58	92	96	497
Total	256	196	141	151	156	900
<i>Nocturnal diarrhea</i>						
Yes	98	70	51	33	30	282
No	158	126	90	118	126	618
<i>Severe Diarrhea or Constipation</i>						
Yes	32	35	17	11	15	110
<i>Hematochezia</i>						
Yes	10	13	18	13	10	64
<i>Fever</i>						
Yes	55	43	29	26	17	170

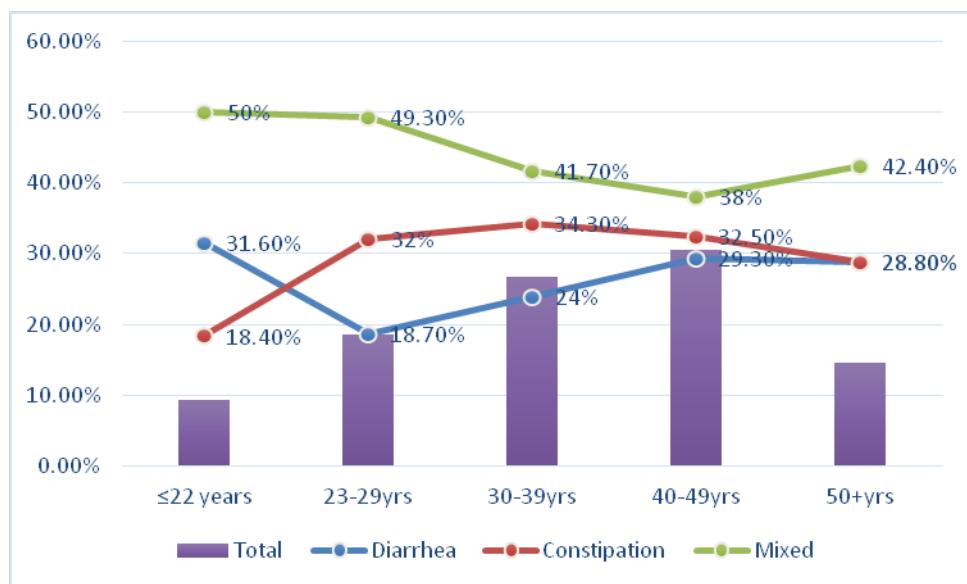


Figure 3. IBS symptoms by age.

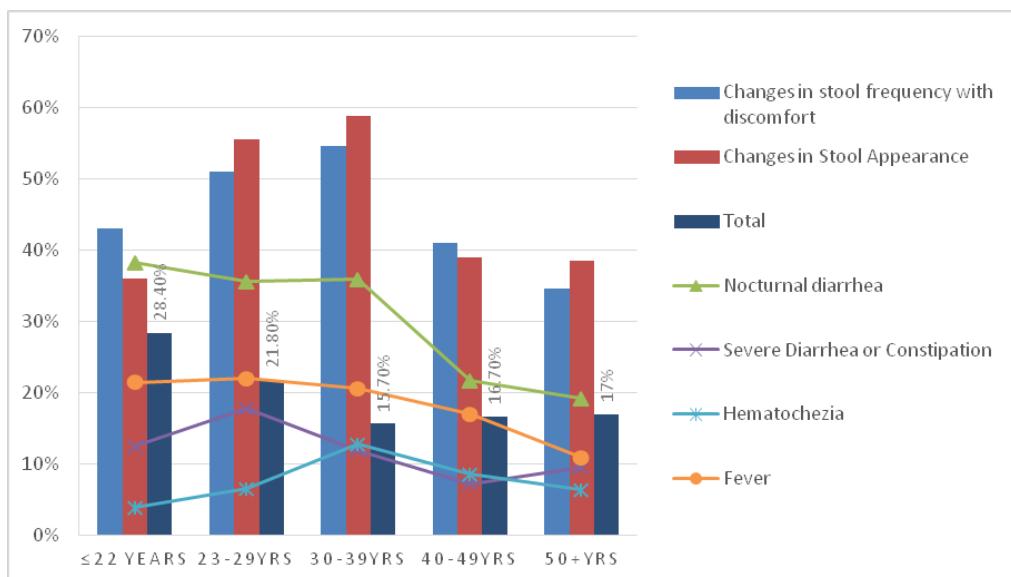


Figure 4. Description of IBS symptoms by age.

6. Discussion

Cramping, abdominal pain, bloating, gas, and diarrhea or constipation, or both. These symptoms may overlap with other gastrointestinal disorders or may greatly vary according to the geographical area, which is linked to specific etiological factors. However, the present study was an attempt to categorize the most common IBS symptoms in Northern Saudi Arabia according to Rome IV criteria.

In the present study, the most common IBS type was mixed followed by constipation and diarrheal, constituting 43%, 31%, and 26%, respectively. The prevalence rates of mixed constipation and diarrheal IBS types among females were 43%, 30.6%, and 26.5%, respectively. Determining the predominant symptom (IBS with diarrhea, IBS with constipation, or mixed IBS) plays an important

role in the selection of diagnostic tests and treatments [10]. Prevalence rates of constipation, diarrhea or both were different for the different geographical area [11–13]. BS IBS-C and chronic constipation (CC) can be difficult to distinguish clinically. The Rome III criteria generate reciprocal barring between IBS-C and CC, based on the existence of abdominal pain, which is a crucial criterion for IBS-C. Previous studies reported that up to 45% of CC patients have abdominal pain and other IBS attributes [14]. Several studies propose that IBS-D is associated with intestinal bacterial microflora, colonic inflammation, and small intestinal bacterial overgrowth [15,16]. Patients with IBS-D responded to bowel symptoms with more stress and distress temporarily [17]. However, the presence of IBS as diarrheal or constipation or mixed is widely variable, based on several factors including its etiology. In a study from Saudi Arabia, to determine the prevalence, severity, and predictors of IBS among nurses found that the prevalence of IBS among nurses was 14.4%, and IBS-Mixed type was the commonest variety (54.5%) [6].

In the current study, changes in stool frequency with discomfort were observed in 44.8% of whom 44.6% were males and 44% were females. Changes in stool appearance were noted 44.8% of whom 47.6% were males and 41.6% were females. Such changes might be associated with dietary habits. Increased intake of food rich in fibers may lead to changes in stool frequency with discomfort. Short-chain soluble and highly fermentable dietary fiber, such as oligosaccharides results in rapid gas production that can cause abdominal pain/discomfort, abdominal bloating/distension, and flatulence in patients with IBS. By contrast, long-chain, intermediate viscous, soluble and moderately fermentable dietary fiber, such as psyllium results in low gas production and the absence of the symptoms related to excessive gas production. Dietary fiber acts on the gastrointestinal tract through several mechanisms, including increased fecal mass with mechanical stimulation/irritation of the colonic mucosa with increasing secretion and peristalsis, and the actions of fermentation byproducts, particularly short-chain fatty acids, on the intestinal microbiota, immune system and the neuroendocrine system of the gastrointestinal tract [18].

Nocturnal diarrhea was identified in 31.3%, and it was more common among females (36%) vs males (24.3%). Sleep interruption is mutual in inflammatory bowel diseases (IBD). However, studies demonstrating a similar prevalence in IBS propose that nighttime disturbance because of diarrhea and abdominal pain may be the main sign of poor sleep quality [19].

Hematochezia was found 6.9%, which was relatively higher among females (7.8%) compared to males (6%) males. Also, fever or weight loss was described by 19% of the patients of whom 22.5% were females and 13.8% were males. In IBS patients, the presence of alarming symptoms (fever, weight loss, rectal bleeding, significant changes in blood chemistry), the presence of palpable abdominal masses, any recent onset of symptoms in patient aged over 50 years, the presence of symptoms at night, and a familial history of celiac disease, colorectal cancer and/or inflammatory bowel diseases all warrant investigation. Treatment strategies are based on the nature and severity of the symptoms, the degree of functional impairment of the bowel habits, and the presence of psychosocial disorders [20].

However, the present study lacks assessment of some IBS related factors particularly genetic and epigenetic factors. Genome-wide association studies, have identified several genetic variants in the context of IBS. Moreover, epigenetic and pharmacogenetic interaction still need more focus, which were not sufficiently addressed in the present study [21]. Studies identified IBS genetic predisposition have suggested that general population-based studies combined with analyses of patient cohorts provide good opportunities for gene discovery in IBS [22].

7. Conclusion

The prevalence of rates of IBS using Rome IV, still within medium values among Northern Saudi population, though, there were higher prevalence rates of IBS symptoms. The most common IBS type was mixed followed by constipation and diarrheal types. All IBS related symptoms were more common among women compared to men.

Acknowledgment

Authors would like to thank medical students at the College of Medicine, the University of Hail for their help in data collection.

Conflict of interest

The author declares no conflicts of interest in this paper.

References

1. Sperber AD, Dumitrescu D, Fukudo S, et al. (2017) The global prevalence of IBS in adults remains elusive due to the heterogeneity of studies: a Rome Foundation working team literature review. *Gut* 66: 1075–1082.
2. Kim YS, Kim N (2018) Sex-Gender Differences in Irritable Bowel Syndrome. *J Neurogastroenterol Motil* 24: 544–558.
3. Schmulson MJ, Drossman DA (2017) What is new in Rome IV. *J Neurogastroenterol Motil* 23: 151–163.
4. Choghakhor R, Abbasnezhad A, Amani R, et al. (2017) Sex-Related Differences in Clinical Symptoms, Quality of Life, and Biochemical Factors in Irritable Bowel Syndrome. *Dig Dis Sci* 62: 1550–1560.
5. Alhazmi AH (2011) Irritable bowel syndrome in secondary school male students in AlJouf Province, north of Saudi Arabia. *J Pak Med Assoc* 61: 1111–1115.
6. Ibrahim NK, Al-Bloushy RI, Sait SH, et al. (2016) Irritable bowel syndrome among nurses working in King Abdulaziz University Hospital, Jeddah, Saudi Arabia. *Libyan J Med* 11: 30866.
7. Simren M, Palsson OS, Whitehead WE (2017) Update on Rome IV Criteria for Colorectal Disorders: Implications for Clinical Practice. *Curr Gastroenterol Rep* 19: 15.
8. Mearin F, Lacy BE, Chang L, et al. (2016) Bowel Disorders, In: Drossman DA, Chang LC, Kellow WJ, et al., editors. *Rome IV functional gastrointestinal disorders—disorders of gut-brain interaction. II*, Raleigh, NC: The Rome Foundation, 967–1057.
9. Kosako M, Akiho H, Miwa H, et al. (2018) Influence of the requirement for abdominal pain in the diagnosis of irritable bowel syndrome with constipation (IBS-C) under the Rome IV criteria using data from a large Japanese population-based internet survey. *Biopsychosoc Med* 12:18.
10. Chey WD, Kurlander J, Eswaran S (2015) Irritable bowel syndrome: a clinical review. *JAMA* 313: 949–958.

11. Chu H, Zhong L, Li H, et al. (2014) Epidemiology characteristics of constipation for the general population, pediatric population, and elderly population in China. *Gastroenterol Res Pract* 2014: 532734.
12. Johanson JF, Kralstein J (2007) Chronic constipation: a survey of the patient perspective. *Aliment Pharmacol Ther* 25: 599–608.
13. Barmeyer C, Schumann M, Meyer T, et al. (2016) Long-term response to a gluten-free diet as evidence for non-celiac wheat sensitivity in one-third of patients with diarrhea-dominant and mixed-type irritable bowel syndrome. *Int J Colorectal Dis* 32: 29–39.
14. Cremonini F, Lembo A (2014) IBS with constipation, functional constipation, painful and non-painful constipation: e Pluribus...Plures? *Am J Gastroenterol* 109: 885–886.
15. Lee SH, Joo NS, Kim KM, et al. (2018) The Therapeutic Effect of a Multistrain Probiotic on Diarrhea-Predominant Irritable Bowel Syndrome: A Pilot Study. *Gastroenterol Res Pract* 2018.
16. Hod K, Sperber AD, Ron Y, et al. (2017) A double-blind, placebo-controlled study to assess the effect of a probiotic mixture on symptoms and inflammatory markers in women with diarrhea-predominant IBS. *Neurogastroenterol Motility* 29.
17. Chan Y, So SH, Mak ADP, et al. (2018) The temporal relationship of daily life stress, emotions, and bowel symptoms in irritable bowel syndrome-Diarrhea subtype: A smartphone-based experience sampling study. *Neurogastroenterol Motil* 18: e13514.
18. El-Salhy M, Ystad SO, Mazzawi T, et al. (2017) Dietary fiber in irritable bowel syndrome. *Int J Mol Med* 40: 607–613.
19. Wilson RG, Stevens BW, Guo AY, et al. (2015) High C-Reactive Protein Is Associated with Poor Sleep Quality Independent of Nocturnal Symptoms in Patients with Inflammatory Bowel Disease. *Dig Dis Sci* 60: 2136–2143.
20. Bellini M, Gambaccini D, Stasi C, et al. (2014) Irritable bowel syndrome: a disease still searching for pathogenesis, diagnosis, and therapy. *World J Gastroenterol* 20: 8807–8820.
21. Gazouli M, Wouters MM, Kapur-Pojskić L, et al. (2016) Lessons learned--resolving the enigma of genetic factors in IBS. *Nat Rev Gastroenterol Hepatol* 13: 77–87.
22. Ek WE, Reznichenko A, Ripke S, et al. (2015) Exploring the genetics of irritable bowel syndrome: a GWA study in the general population and replication in multinational case-control cohorts. *Gut* 64: 1774–1782.



AIMS Press

© 2019 the Author(s), licensee AIMS Press. This is an open access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>)