

To Cite:

Al-Hazmi AI, Almakinah ZYH, Almutairi NOM, Al-Nujaidi AJA, Al-Thobaiti LY, Alghamdi HAM. Prevalence of irritable bowel syndrome (IBS) and its impact on quality of life among adult general Saudi population in Al-Baha region, Saudi Arabia: A cross-sectional study. *Medical Science* 2022; 26: ms525e2550.
doi: <https://doi.org/10.54905/disssi/v26i130/ms525e2550>

Authors' Affiliation:

¹Internal Medicine Department, Faculty of Medicine, Al-Baha University, Saudi Arabia

²Medical Intern, Faculty of Medicine, Al-Baha University, Saudi Arabia

³Pediatrics Resident, King Fahad Hospital, Al-Baha, Saudi Arabia

***Corresponding author**

Medical Intern, Faculty of Medicine, Al-Baha University, Saudi Arabia

Email: loayotb@gmail.com

Peer-Review History

Received: 28 October 2022

Reviewed & Revised: 01/November/2022 to 06/December/2022

Accepted: 10 December 2022

Published: 14 December 2022

Peer-review Method

External peer-review was done through double-blind method.

URL: <https://www.discoveryjournals.org/medicallscience>



This work is licensed under a Creative Commons Attribution 4.0 International License.

Prevalence of irritable bowel syndrome (IBS) and its impact on quality of life among adult general Saudi population in Al-Baha region, Saudi Arabia: A cross-sectional study

Areej I Al-Hazmi¹, Zahraa Y H Almakinah², Nawaf O M Almutairi², Anfal J A Al-Nujaidi², Loay Y Al-Thobaiti^{2*}, Hanin A M Alghamdi³

ABSTRACT

Background: Irritable bowel syndrome (IBS) is a condition that is characterized by irregular bowel movements and recurring stomach pain in the absence of anatomical or biochemical abnormalities. Based on Rome IV criteria, four bowel patterns may be seen. Quality of life (QOL) seems to be affected in patients with IBS. **Objectives:** To measure the prevalence of IBS in Al-Baha region using Rome IV criteria and evaluate the effect of IBS on QOL. **Methods:** This cross-sectional study analyzed data from a population-based survey of adults in Al-Baha region (410 valid responses, 76.3% females, aged 18 and older). The questionnaire covered the sociodemographic characteristics, Rome IV diagnostic criteria for IBS and QOL of participants using the Euro QOL 5-Dimension, 3- Level (EQ-5D-3L) questionnaire. **Results:** 27.3% of the participants (74.1% females) met Rome IV criteria. The most frequent subtype among IBS patients was IBS-M (42.86%), which was followed by IBS-C (25.89%), IBS-D (16.96%) and IBS-U (14.29%). Smokers had an equal distribution of the four types of IBS, while 87.5% of the non-smokers had IBS-M. IBS-C was recorded as the most common sub type in participants diagnosed with depression or stress 20.69%. The mean EQ-VAS score of QOL was lower in IBS patients (73.83% vs. 83.37% in non-IBS). **Conclusion:** The prevalence of the disease in this study was 27.3% and the most common subtype among IBS was IBS-M type. There was no association between educational level or gender and increased risk of IBS. The QOL is significantly lower in IBS patients than in non-IBS.

Keywords: Irritable bowel syndrome, IBS, Prevalence, Rome IV criteria, Quality of Life.

1. INTRODUCTION

In the absence of anatomical or biochemical anomalies, irritable bowel syndrome (IBS) is a Condition marked by irregular bowel movements and recurrent abdominal pain. The cause of IBS is unknown (Bercik et al., 2005). The risk factors can be either environmental such as stress, socioeconomic factors, drugs and food or personal such as gender, age and psychological variables. IBS patients experiment with lifestyle modifications and dietary restrictions to alleviate their symptoms (Bohn et al., 2013). A significant correlation has been found between IBS severity and psychiatric problems, particularly depression and anxiety (Qin et al., 2014; Al-Shammari et al., 2022). IBS symptoms increase significantly with low levels of physical activity; thus, increased physical activity plays a role in improving IBS symptoms (Aljammaz et al., 2020). Many IBS patients believe that their symptoms are caused by food sensitivity. Therefore, dietary changes are widely used to either lessen or worsen IBS symptoms (Lenhart et al., 2018). IBS can be distinguished from celiac disease and other inflammatory bowel illnesses (such as ulcerative colitis and Crohn's disease) because it does not manifest with structural or biochemical abnormalities (Verdu et al., 2009). The underlying pathologic mechanism and etiology of IBS are still unknown. IBS is typically believed to be caused by various circumstances (Makker et al., 2015). Changes in bowel habits, sensitivity, infection, brain-gut connections, changed fecal flora, bacterial overgrowth, food allergy, carbohydrate malabsorption and intestinal inflammation are all factors that contribute to the pathological process of IBS (Occhipinti and Smith, 2012). The prevalence of IBS increases with aging and psychological stress and it is strongly associated with females and current smokers (Nam et al., 2010). Increased perception of visceral pain and sensations is considered a sign of bowel hypersensitivity, as IBS patients experience pain when a balloon is inflated inside the descending colon at low pressures in comparison to healthy individuals (Drossman et al., 2006).

IBS patients have a deregulated braingut axis, which may be related to increased stress reactivity and altered modulation or perception of the afferent signals from the enteric nervous system (Burns et al., 2019). IBS patients are believed to experience minor changes in the microscopic structure of their large and small intestinal mucosa, changes in their gut T lymphocytes and an increase in mast cells (Kellow et al., 2006). These findings imply that the immune system might be involved. Although 7% and 21% of IBS patients, diagnostic uncertainty and patient and physician dissatisfactions are caused by a lack of assessment techniques and limited understanding of the pathologic mechanisms (Chey et al., 2015; Lovell and Ford, 2012).

IBS can only be diagnosed based on a patient's medical history because there are no objective diagnostic findings that can identify IBS. Currently, IBS is diagnosed using the Rome IV criteria (Palsson et al., 2016). Patients may have one of four bowel patterns, as determined by the Rome IV criteria: IBS-D (diarrhea-predominant IBS), IBS-C (constipation-predominant IBS), IBS-M (diarrhea and constipation mixed-patterned IBS) or unclassified IBS (IBS-U) (Schmulson and Drossman, 2017).

IBS has a negative effect on patients' daily life and activities and it has been linked to mood disorders such as depression and anxiety (Hungin et al., 2005). Functional gastrointestinal disorders affect about 4% of the world's population. According to the Rome IV criteria, IBS patients account for 3%–5% of individuals (Sperber et al., 2021).

Inconvenient conditions such as IBS should not be disregarded. IBS significantly affects a patient's daily life and social interaction. It diminishes their focus, strength, vitality and confidence and adversely affects their level of quality of life (QOL) (Canavan et al., 2014).

IBS Patients visit their physicians more frequently, have more diagnostic tests done, receive more medications, miss work more frequently, are less productive at work, are admitted to hospitals more frequently and have higher direct costs than non-IBS individuals. IBS can be effectively treated by combining non pharmacological therapies and pharmacotherapy. The physician-patient relationship also plays a primary role in the treatment. Lifestyle modifications, such as increasing physical activity and avoiding stress, can improve gastrointestinal symptoms. Additionally, dietary modifications are considered the first-line treatment of IBS (Adriani et al., 2018). There has not been any prior research on the prevalence of IBS in the Saudi community in Al-Baha region right now. Additionally, numerous studies conducted in different regions of the Saudi Arabian Kingdom (KSA) have discovered evidence supporting a strong relationship between IBS and psychosomatic symptoms in IBS patients.

2. METHODS

Study setting and population

This study is cross-sectional survey that was conducted in Al-Baha region from February 2022 to March 2022. Participants were randomly selected from residents in Al-Baha region who were over 18 years old.

Sampling method

The minimum required sample size was 384 based on Al-Baha region population (with an error margin of 5% and a confidence interval of 95%). To ensure accuracy, we increased the sample size to 400 to account for any missing data.

Inclusion and exclusion criteria

Participants who were over 18 years old and volunteered to participate in this survey study were invited to complete an online questionnaire if they demonstrated the ability to comprehend it. Participants who disagreed to participate in the study or those who had an incomplete questionnaire were excluded from the study.

Data collection and questionnaire development

We used Google Forms to distribute the online questionnaire in order to gather the required data. The survey was translated into Arabic and it consisted of three sections. The first section included sociodemographic questions. The second section included questions from the Rome IV diagnostic criteria for IBS. The Rome Foundation approved the use of the Rome IV diagnostic questionnaire in this study. The Rome IV diagnostic criteria are as follows: The presence of abdominal pain in the last three months, abdominal pain that occurs just before, during or after a bowel movement; stools that are softer or harder than usual when pain occurs; stools that are either more or less than usual when pain occurs; pain that has lasted for six months or longer; and abnormal stools in the last three months. The Rome IV questionnaire also uses the Bristol Stool Scale to classify IBS patients into one of four subgroups: Patients with IBS-D, IBS-C, IBS-M or IBS-U. The Euro QOL 5-dimension 3-level (EQ-5D-3L) instrument was used to assess the participants' QOL in the third section of the questionnaire. The mobility, self-care, regular activities, pain/discomfort and anxiety/depression levels of the participants were all assessed using this questionnaire. Three ratings are available for each of these five dimensions: "No problems" (level 1), "some problems" (level 2) and "severe problems" (level 3). The participants indicated their current state of health by selecting the most applicable statement in each dimension.

Ethical considerations

All participants provided informed consent. Participants were offered the option to participate in this study and they were assured that their personal information would be kept anonymous and confidential. This study was approved by the Scientific Research and Ethics Committee of the Faculty of Medicine, Al-Baha University.

3. RESULTS

The electronic survey was completed by 425 participants, 15 were excluded for not meeting the inclusion criteria and the included 410 participants were screened for IBS using Rome IV criteria (Figure 1).

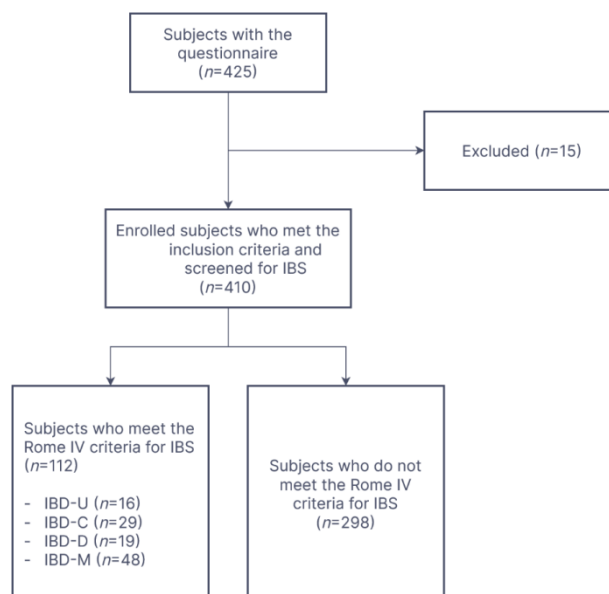


Figure 1 Study flow chart

Table 1 shows the prevalence of IBS based on the participants' sociodemographic characteristics. This study consisted of 97 males (23.7%) and 313 females (76.3%) aged 18 to 55+ years and approximately 80.5% of them were under 45 years old. Most of the participants were Saudi citizens (97.6%) and had higher education levels (75.4%). Regarding the marital status and employment status, 58.8% of the participants were single, while 63.9% were unemployed. Regarding the smoking status, 87.6% of the participants had never smoked. Furthermore, 43.2% of the participants had normal body mass index (BMI) and 90.0% had not been diagnosed with depression or stress. Additionally, 75.5% of the participants who had not undergone prior abdominal surgeries had no IBS, whereas 57.1% of those who had undergone prior abdominal surgeries had no IBS (p-value < 0.05).

Table 1 Prevalence of IBS based on the participants' sociodemographic characteristics

Factor	Non-IBS (n=298)	IBS (n=112)	Total (n=410)	p-value
Age (years)				
18-25	177(74.1)	62 (25.9)	239(58.3)	0.350
26-35	26 (65.0)	14 (35.0)	40 (9.8)	
36-45	33 (64.7)	18 (35.3)	51 (12.4)	
46-55	55 (76.4)	17 (23.6)	72 (17.6)	
>55	7 (87.5)	1 (12.5)	8 (2.0)	
Gender				
Male	68 (70.1)	29 (29.9)	97 (23.7)	0.514
Female	230(73.5)	83 (26.5)	313(76.3)	
Nationality				
Saudi	292(73.0)	108(27.0)	400(97.6)	0.362
Non-Saudi	6 (60.0)	4 (40.0)	10 (2.4)	
Educational level				
Elementary school	4 (57.1)	3 (42.9)	7 (1.7)	0.084
Intermediate school	12 (92.3)	1 (7.7)	13 (3.2)	
High school	65 (80.2)	16 (19.8)	81 (19.8)	
Higher education	217(70.2)	92 (29.8)	309(75.4)	
Marital status				
Single	176(73.0)	65 (27.0)	241(58.8)	0.664
Married	116(72.0)	45 (28.0)	161(39.3)	
Divorced	3 (60.0)	2 (40.0)	5 (1.2)	
Widow	3 (100.0)	0 (0.0)	3 (0.7)	
Employment status				
Employed	83 (68.6)	38 (31.4)	121(29.5)	0.333
Unemployed	193(73.7)	69 (26.3)	262(63.9)	
Retired	22 (81.5)	5 (18.5)	27 (6.6)	
Smoking status				
Currently smoking	20 (64.5)	11 (35.5)	31 (7.6)	0.031*
Ex-smoking	10 (50.0)	10 (50.0)	20 (4.9)	
Never smoked	268(74.7)	91 (25.3)	359(87.6)	
BMI				
Underweight	32 (74.4)	11 (25.6)	43 (10.5)	0.972
Normal	131(73.7)	46 (26.0)	177(43.2)	
Overweight	81 (71.7)	32 (28.3)	113(27.6)	
Obese	32 (71.1)	13 (28.9)	45 (11.0)	

Extremely obese	22 (68.8)	10 (31.3)	32 (7.8)	
Diagnosed with depression or stress				0.506
Yes	28 (68.3)	13 (31.7)	41 (10.0)	
No	270(73.2)	99 (26.8)	369(90.0)	
Previous abdominal surgeries				0.003*
Yes	36 (57.1)	27 (42.9)	63 (15.4)	
No	262(75.5)	85(24.5)	347(84.6)	

*Statistical significance was defined as a p-value of 0.05 or lower

The Bristol Stool Form Scale results revealed that 14.29% (16/112) had IBS-U, 16.96% (19/112) had IBS-D, 25.89% (29/112) had IBS-C and 42.86% (48/112) had IBS-M. We observed IBS-U only among males (n = 2), whereas IBS-D (n = 10) was the least common subtype in females. In both genders, IBS-M was the most prevalent subtype; however, in females it was more common than in males (79.17% vs. 20.83%). It should be noted that IBS-M was more common in the 18–45-year-old age group than in the older age group (85.42% vs. 12.5%) which mainly had IBS-C (n = 6). Most Saudi and non-Saudi participants had IBS-M. However, only one non-Saudi participant had IBS-C (3.44%; 1/29). Participants with higher education were the most common in all the IBS groups and most of them had IBS-M (79.17%). About 60.42% (29/48) of the single participants had IBS-M and 26 of them had either IBS-D or IBS-C. IBS-C was more common in the married participants than in the single participants (51.72% vs. 44.83%). Additionally, 60.42% (29/48) of the unemployed participants had IBS-M, whereas 33.33% (16/48) of the employed participants had IBS-M. Only three IBS-M participants had retired.

Participants who currently smoked were included in each IBS subtype, with an equal number (n = 3) for IBS-C, IBS-D and IBS-M and n = 2 for IBS-U. Additionally, 13.8% (4/29) of participants who formerly smoked had IBS-C, whereas 87.5% (42/48) of the participants who had never smoked had IBS-M. IBS-C was identified as the most common subtype in the participants diagnosed with depression or stress (20.69%; 6/29). Regarding BMI, 26.32% (5/19) of the extremely obese participants had IBS-D, while the remaining had IBS-M. Most of the participants who had or had not undergone prior abdominal surgery reported having IBS-M. About 24.14% (7/29) of the participants who had undergone prior abdominal surgery had IBS-C, while 21.05% (4/19) had IBS-D (Table 2).

Table 2 Main IBS subtypes declaration and statistical analysis of its relation to independent factors

Factor	IBS-U (n=16)	IBS-C (n=29)	IBS-D (n=19)	IBS-M (n=48)	p-value
Age (years)					
18-25	10(16.1)	14(22.6)	13(21.0)	25(40.3)	0.7
26-35	2 (14.3)	3(21.4)	1 (7.1)	8 (57.1)	
36-45	2 (11.1)	4 (22.2)	4 (22.2)	8 (44.4)	
46-55	2 (11.8)	8 (47.1)	1 (5.9)	6 (35.3)	
>55	0 (0.0)	0 (0.0)	0 (0.0)	1(100.0)	
Gender					
Male	2 (6.9)	8 (27.6)	9 (31.0)	10(34.5)	0.08
Female	14(16.9)	21(25.3)	10(12.0)	38(45.8)	
Nationality					
Saudi	16(14.8)	28 (25.9)	19(17.6)	45(41.7)	0.513
Non-Saudi	0 (0.0)	1 (25.0)	0 (0.0)	3 (75.0)	
Educational level					
Elementary school	1 (33.3)	2 (66.7)	0 (0.0)	0 (0.0)	0.616
Intermediate school	0 (0.0)	0 (0.0)	0 (0.0)	1(100.0)	
High school	2 (12.5)	3 (18.8)	2 (12.5)	9 (56.3)	

Higher education	13(14.1)	24(26.1)	17(18.5)	38(41.3)	
Marital status					0.697
Single	10(15.4)	13(20.0)	13(20.0)	29(44.6)	
Married	6 (13.3)	15(33.3)	6 (13.3)	18(40.0)	
Divorced	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	
Employment status					0.812
Employed	5 (13.2)	11(28.9)	6 (15.8)	16(42.1)	
Unemployed	11(15.9)	16(23.2)	13(18.8)	29(42.0)	
Retired	0 (0.0)	2 (40.0)	0 (0.0)	3 (60.0)	
Smoking status					0.778
Currently smoking	2 (18.2)	3 (27.3)	3 (27.3)	3 (27.3)	
Ex-smoking	1 (10.0)	4 (40.0)	2 (20.0)	3 (30.0)	
Never smoked	13(14.3)	22(24.2)	14(15.4)	42(46.2)	
Diagnosed with depression or stress					0.154
Yes	0 (0.0)	6 (46.2)	3 (23.1)	4 (30.8)	
No	16(16.2)	23(23.2)	16(16.2)	4 (44.4)	
BMI					0.379
Underweight	1 (9.1)	3 (27.3)	2 (18.2)	5 (45.5)	
Normal	7 (15.2)	14(30.4)	5 (10.9)	20(43.5)	
Overweight	3 (9.4)	9 (28.1)	5 (15.6)	15(46.9)	
Obese	3 (23.1)	3 (23.1)	2 (15.4)	5 (38.5)	
Extremely obese	2 (20.0)	0 (0.0)	5 (50.0)	3 (30.0)	
Previous abdominal surgeries					0.989
Yes	4 (14.8)	7 (25.9)	4 (14.8)	12(44.4)	
No	12(14.1)	22(25.9)	15(17.6)	36(42.4)	

*Statistical significance was defined as a p-value of 0.05 or lower

Table 3 displays the frequencies and proportions of health-related QOL (HRQOL) reported for each dimension and its level using the EQ-5D-3L instrument. For the mobility dimension, 8.03% (85/112) of the IBS participants and 3.69% (251/298) (3.69%) of the non-IBS participants had no problems. For the self-care dimension, 96.4% (108/112) of the IBS participants and 98.9% (295/298) of the non-IBS participants had no problems. For the regular activity dimension, 76.7% (86/112) of the IBS participants and 83.5% (249/298) of the non-IBS participants had no problems. For the pain/discomfort dimension, 59.8% (67/112) of the IBS participants had some problems, whereas 62.4% (186/298) of the non-IBS participants had no problems (p-value<0.05). For the anxiety/depression dimension, 52.6% (59/112) of the IBS participants had some problems, whereas 58.7% (175/298) of the non-IBS participants had no problems (p-value < 0.05). Compared to the non-IBS group, the IBS group had a lower percentage of participants who reported having no problems in each health dimension (Figure 2).

Table 3 Frequencies and proportions of Health-Related Quality of Life (HRQOL) using EQ-5D-3L reported by dimension and level

Factor	Non-IBS (n=298)	IBS (n=112)	Total (n=410)	P value
Mobility				
Level 1 (No problems)	251 (74.7)	85 (25.3)	336	0.663
Level 2 (Moderate problems)	41 (63.1)	24 (36.9)	65	
Level 3 (Extreme)	6 (66.7)	3 (33.3)	9	

problems)				
Self-care				
Level 1 (No problems)	295 (73.2)	108 (26.8)	403	0.074
Level 2 (Moderate problems)	3 (42.9)	4 (57.1)	7	
Level 3 (Extreme problems)	0 (0.0)	0 (0.0)	0	
Usual activities				
Level 1 (No problems)	249 (74.3)	86 (25.7)	335	0.276
Level 2 (Moderate problems)	46 (65.7)	24 (34.3)	70	
Level 3 (Extreme problems)	3 (60.0)	2 (40.0)	5	
Pain/discomfort				
Level 1 (No problems)	186 (86.1)	30 (13.9)	216	<0.001*
Level 2 (Moderate problems)	104 (60.8)	67 (39.2)	171	
Level 3 (Extreme problems)	8 (34.8)	15 (65.2)	23	
Anxiety/depression				
Level 1 (No problems)	175 (81.0)	41 (19.0)	216	<0.001*
Level 2 (Moderate problems)	108 (64.7)	59 (35.3)	167	
Level 3 (Extreme problems)	15 (55.6)	12 (44.4)	27	

*Statistical significance was defined as a p-value of 0.05 or lower

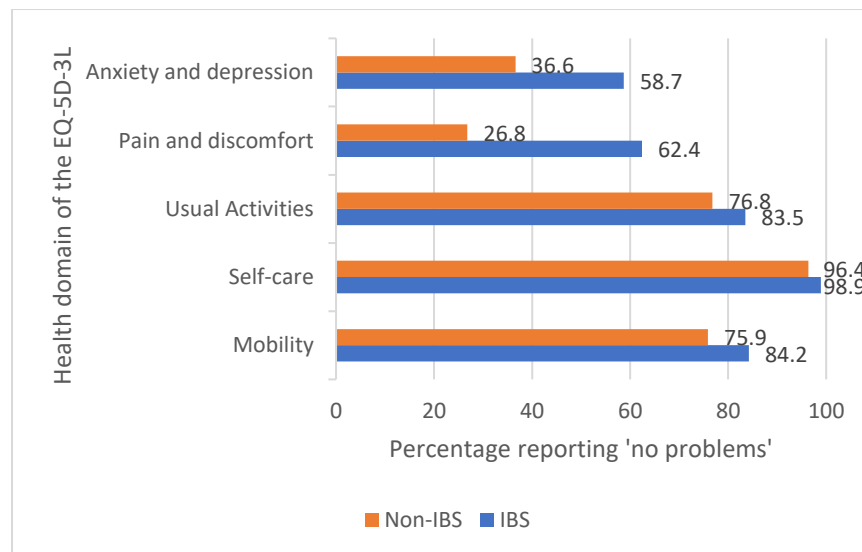


Figure 2 A clustered bar chart comparing the percentage of IBS patients and non-IBS patients who report having no problems across EQ-5D-3L domains

Table 4 shows that the non-IBS participants were healthier than the IBS participants based on the EQ-VAS score. Figure 3 shows the mean EQ-VAS score for both males and females in five age groups.

Table 4 EQ-VAS mean score between the two groups

Factor	Mean (SD)	p-value
IBS	73.83 (19.81)	<0.001*
Non-IBS	83.37 (16.91)	

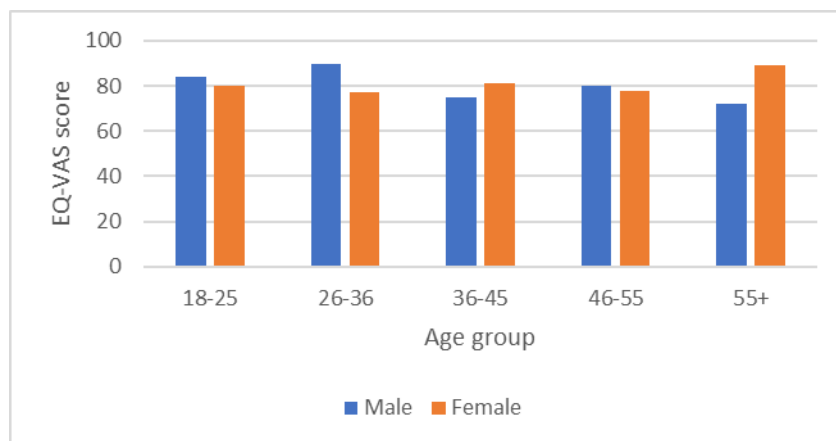


Figure 3 Mean participant EQ-VAS scores by gender and age group

4. DISCUSSION

Irritable bowel disease is one of the universal chronic diseases that affect the quality of life. The importance of this paper is to measure the prevalence of IBS in Al-Baha region using Rome IV criteria and evaluate the effect of IBS. The study’s findings showed that the overall prevalence of IBS among Saudi Arabia’s Al-Baha population was 27.3%. In addition, this is the first study to investigate the prevalence of IBS and how it affects the quality of life in the Al-Baha area in Saudi Arabia. Although there are numerous studies on the causes and prevalence of IBS worldwide, there are few studies on its prevalence in Saudi Arabia. In this study, the most common subtype of irritable bowel syndrome was IBS-M, which was detected in 42.86% of both male and female IBS patients and in 85.42% of patients between the ages of 18 years and 45 years. IBS-C was discovered in 25.89% (29/112) of patients who were older than 45 years (n = 6). Alqahtani et al., (2019) reported similar findings in Saudi Arabia. They stated that of all IBS diagnoses, IBS-M accounts for 42.3%, followed by IBS-C (27.2%), IBS-D (21.6%) and IBS-U (8.8%) (Alqahtani and Mahfouz, 2019). According to a recent epidemiological study, IBS-M is the most prevalent subtype abroad, such as in the United Kingdom, Canada and the United States (Palsson et al., 2020). The study did not address older age groups, which is consistent with recent local studies. We discovered that the most common age group range was 26-45 years old (Alqahtani and Mahfouz, 2019; Arishi et al., 2021).

Although most of the participants with higher education had IBS-M (79.17%), there was no relationship between high educational levels and increased risk of IBS. Conversely, we discovered an inverse relationship between increased IBS risk and education. Previous studies have also showed an inverse relationship with education (Andrews et al., 2005). However, some studies have reported opposite findings to our results (Mansouri et al., 2017). There were more single participants with IBS-M (60.42%; 29/48) than married participants, which mainly had IBS-C (51.72%). We also discovered the same results for the single and married participants; no significantly increased risk was detected, which is consistent with previous findings (Alqahtani and Mahfouz, 2019). Conversely, two previous studies obtained inconclusive results regarding whether IBS is more prevalent in married patients than in single patients (Han et al., 2006). We found no significant difference in IBS prevalence between both genders. Also, in this paper, there is no higher significant difference between female and male and the female to male ratio it was 1.27:1 (AlButaysh et al., 2020; Okami et al., 2011).

Most of the participants (87.5%) who had never smoked had IBS-M, while participants who were active smokers had an equal number (n = 3) in each IBS subtype (i.e., BS-C, IBS-D, and IBS-M). Most of the participants who formerly smoked had IBS-C (13.8%; 4/29). In line with previous findings, our findings revealed a significant difference between smokers, nonsmokers and former smokers (Alqahtani and Mahfouz, 2019; Arishi et al., 2021). In contrast to a prior study, which found no significant correlation between IBS and BMI, our study found a high association between extremely obese participants and IBS, especially with IBS-D. In the present study, we found no significant difference between patients who had abdominal surgery and those without. Similarly,

previous studies have similar finding which have no significant difference (Alqahtani and Mahfouz, 2019). Previous studies have showed that there is a connection between psychological stress/anxiety and IBS (Alqahtani and Mahfouz, 2019; Stasi et al., 2012; Gwee et al., 2010). We evaluated the frequencies and proportions of HRQOL using EQ-5D-3L. Most irritable bowel syndrome patients had some problems with their symptoms, particularly pain and discomfort and then some of them had anxiety and depression. Similarly, previous studies have reported a highly significant association between stress, anxiety and IBS patients. Furthermore, there was a study that compared the IBS prevalence between students in medical college and students in other colleges and the study demonstrated higher prevalence among students in medical college than other students; because of stressful medical students' lifestyles. All these studies suggest negative relationships between irritable bowel syndrome symptoms and quality of life (AlButaysh et al., 2020; Okami et al., 2011).

Our study result revealed that there is no high association between depression and IBS patients; this agrees with the results of (Alqahtani and Mahfouz, 2019). The special thing in this study compared to other research, that this study assessed the prevalence of irritable bowel syndrome in a specific region, which is Al-Baha city, southwest of Saudi Arabia, which makes the results more specific. The present study has some limitations, even though it offers useful information about the prevalence of IBS and its effects on the QOL of the study population. In our cross-sectional investigation, participants who met the IBS diagnostic criteria were not evaluated to rule out other possible diseases. Another limitation is that the study was conducted using a web-based cross-sectional survey, rather than a conventional method. The participants were selected via social media during a very specific period, which may have impacted the response rate of this study. This is mainly true in that this study ignored residents in areas with no internet access and limited social interaction owing to vacations or other personal reasons.

Additionally, a relationship between IBS and its effects on QOL could not be established because of the cross-sectional technique used in this study. The strengths of this study were the use of a reliable Arabic-translated Rome IV form, the use of a sampling technique to minimize choice bias and the use of all Al-Baha region sectors to generate a representative sample of Al-Baha population. All these factors contributed to the generation of a representative sample of the Al-Baha population. Undoubtedly, this study can improve epidemiologic data on IBS prevalence in the KSA (using the most recent Rome criteria). Additional prospective studies are needed to evaluate the connection between these risk variables and IBS.

5. CONCLUSION

The Rome IV criteria for diagnosing IBS were met by 27.3% of the participants. The most common subtype among IBS patients was IBS-M (42.86%), which was followed by IBS-C (25.89%), IBS-D (16.96%) and IBS-U (14.29%), which was the least common subtype. We did not find that one gender had a substantially higher prevalence of IBS than the other and that there was no correlation between the educational level and an increased risk of developing IBS. Participants who were married and single had similar results. No highly significant risk was found. Smokers, non-smokers and former smokers all showed a highly significant difference.

Acknowledgment

We thank the population of Al-Baha region for their cooperation during the study.

Author Contributions

All authors contributed evenly with regards to development of study design, data collection and analysis, interpretation of data, drafting the manuscript and critical revision.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Ethical approval

This study was approved by the Research Ethics Committee in Faculty of Medicine, Al-Baha University with the ethical approval number (REC/MED/BU-FM/2022/3).

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

REFERENCES AND NOTES

- Adriani A, Ribaldone DG, Astegiano M, Durazzo M, Saracco GM, Pellicano R. Irritable bowel syndrome: The clinical approach. *Panminerva Med* 2018; 60(4):213-22.
- AlButaysh OF, AlQuraini AA, Almukhaitah AA, Alahmdi YM, Alharbi FS. Epidemiology of irritable bowel syndrome and its associated factors in Saudi undergraduate students. *Saudi J Gastroenterol* 2020; 26(2):89.
- Aljammaz KI, Alrashed AA, Alzward AA. Irritable bowel syndrome: Epidemiology and risk factors in the adult Saudi population of the central region. *Niger J Clin Pract* 2020; 23(10):1414-8.
- Alqahtani NH, Mahfouz ME. The prevalence and risk factors of irritable bowel syndrome in Saudi Arabia in 2019. *Int J Prev Med* 2022; 13.
- Al-Shammari SA, Al-Mogren RA, Al-Nofaie MF, Al-Shammari RT, Alfirm RB, Julaidan GS. Irritable bowel syndrome prevalence and health-related quality of life in women with polycystic ovary syndrome at tertiary hospitals in Riyadh, Saudi Arabia. *Medical Science* 2022; 26:ms76e1987. doi: 10.54905/disssi/v26i121/ms76e1987
- Andrews EB, Eaton SC, Hollis KA, Hopkins JS, Ameen V, Hamm LR, Cook SF, Tennis P, Mangel AW. Prevalence and demographics of irritable bowel syndrome: Results from a large web-based survey. *Aliment Pharmacol Ther* 2005; 22(10):935-42.
- Arishi AM, Elmakki EE, Hakami OM, Alganmy OM, Maashi SM, Al-Khairat HK, Sahal YA, Sharif AA, Alfaifi MH. Irritable bowel syndrome: Prevalence and risk factors in Jazan Region, Saudi Arabia. *Cureus* 2021; 13(6).
- Bercik P, Verdu EF, Collins SM. Is irritable bowel syndrome a low-grade inflammatory bowel disease? *Gastroenterol Clin N* 2005; 34(2):235-45.
- Bohn L, Storsrud S, Tornblom H, Bengtsson U, Simren M. Self-reported food-related gastrointestinal symptoms in IBS are common and associated with more severe symptoms and reduced quality of life. *Am J Gastroenterol* 2013; 108(5):634-41.
- Burns G, Carroll G, Mathe A, Horvat J, Foster P, Walker MM, Talley NJ, Keely S. Evidence for local and systemic immune activation in functional dyspepsia and the irritable bowel syndrome: A systematic review. *Am J Gastroenterol* 2019; 114(3):429-36.
- Canavan C, West J, Card T. The economic impact of the irritable bowel syndrome. *Aliment Pharmacol Ther* 2014; 40(9):1023-34.
- Chey WD, Kurlander J, Eswaran S. Irritable bowel syndrome: A clinical review. *J Am Med Assoc* 2015; 313(9): 949-58.
- Drossman DA, Corazziari E, Delvaux M, Spiller RC, Talley NJ, Thompson WG, Whitehead WE. Rome III: The Functional Gastrointestinal Disorders, 3rd Edition, Degnon Associates. McLean, VA 2006; 917-951.
- Gwee KA, Bak YT, Ghoshal UC, Gonlachanvit S, Lee OY, Fock KM, Chua AS, Lu CL, Goh KL, Kositchaiwat C, Makharia G. Asian consensus on irritable bowel syndrome. *J Gastroenterol Hepatol* 2010; 25(7):1189-205.
- Han SH, Lee OY, Bae SC, Lee SH, Chang YK, Yang SY, Yoon BC, Choi HS, Hahm JS, Lee MH, Lee DH. Prevalence of irritable bowel syndrome in Korea: Population-based survey using the Rome II criteria. *J Gastroenterol Hepatol* 2006; 21(11):1687-92.
- Hungin AP, Chang L, Locke GR, Dennis EH, Barghout V. Irritable bowel syndrome in the United States: Prevalence, symptom patterns and impact. *Aliment Pharmacol Ther* 2005; 21(11):1365-75.
- Kellow JE, Azpiroz F, Delvaux M, Gebhart GF, Mertz HR, Quigley EM, Smout AJ. Applied principles of neurogastroenterology: Physiology/motility sensation. *Gastroenterol* 2006; 130(5):1412-20.
- Lenhart A, Ferch C, Shaw M, Chey WD. Use of dietary management in irritable bowel syndrome: Results of a survey of over 1500 United States gastroenterologists. *J Neurogastroenterol Motil* 2018; 24(3):437.
- Lovell RM, Ford AC. Global prevalence of and risk factors for irritable bowel syndrome: A meta-analysis. *Clin Gastroenterol H* 2012; 10(7):712-21.
- Makker J, Balar B, Niazi M, Daniel M. Strongyloidiasis: A case with acute pancreatitis and a literature review. *World J Gastroenterol* 2015; 21(11):3367.
- Mansouri A, Rarani MA, Fallahi M, Alvandi I. Irritable bowel syndrome is concentrated in people with higher education's in Iran: An inequality analysis. *Epidemiol Health* 2017; 39.
- Nam SY, Kim BC, Ryu KH, Park BJ. Prevalence and risk factors of irritable bowel syndrome in healthy screened

- undergoing colonoscopy and laboratory tests. *J Neurogastroenterol Motil* 2010; 16(1):47.
23. Occhipinti K, Smith JW. Irritable bowel syndrome: A review and update. *Clin Colon Rectal Surg* 2012; 25(01):046-52.
 24. Okami Y, Kato T, Nin G, Harada K, Aoi W, Wada S, Higashi A, Okuyama Y, Takakuwa S, Ichikawa H, Kanazawa M. Lifestyle and psychological factors related to irritable bowel syndrome in nursing and medical school students. *J Gastroenterol* 2011; 46(12):1403-10.
 25. Palsson OS, Whitehead W, Tornblom H, Sperber AD, Simren M. Prevalence of Rome IV functional bowel disorders among adults in the United States, Canada and the United Kingdom. *Gastroenterol* 2020; 158(5):1262-73.
 26. Palsson OS, Whitehead WE, Tilburg MAV, Chang L, Chey W, Crowell MD, Keefer L, Lembo AJ, Parkman HP, Rao SS, Sperber A, Spiegel B, Tack J, Vanner S, Walker LS, Whorwell P, Yang Y. Rome IV Diagnostic Questionnaires and Tables for Investigators and Clinicians. *Gastroenterol* 2016; S0016-5085(16)00180-3. doi: 10.1053/j.gastro.2016.02.014
 27. Qin HY, Cheng CW, Tang XD, Bian ZX. Impact of psychological stress on irritable bowel syndrome. *World J Gastroenterol* 2014; 20(39):14126.
 28. Schmulson MJ, Drossman DA. What is new in Rome IV. *J Neurogastroenterol Motil* 2017; 23(2):151–163.
 29. Sperber AD, Bangdiwala SI, Drossman DA, Ghoshal UC, Simren M, Tack J, Whitehead WE, Dumitrascu DL, Fang X, Fukudo S, Kellow J. Worldwide prevalence and burden of functional gastrointestinal disorders, results of Rome Foundation Global Study. *Gastroenterol* 2021; 160(1):99-114.
 30. Stasi C, Rosselli M, Bellini M, Laffi G, Milani S. Altered neuro endocrine-immune pathways in the irritable bowel syndrome: The top-down and the bottom-up model. *J Gastroenterol* 2012; 47(11):1177-85.
 31. Verdu EF, Armstrong D, Murray JA. Between celiac disease and irritable bowel syndrome: The “no man’s land” of gluten sensitivity. *Am J Gastroenterol* 2009; 104(6):1587.