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Original Article

Irritable Bowel Syndrome: Psychological Disorder or Poverty? Results of a Large Cross-sectional Study in Iran

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Abstract

Background: Irritable bowel syndrome (IBS) is a functional disease with no exact laboratory or imaging findings. IBS is more common in areas with a history of psychological trauma and war. This study aims to report the prevalence and possible determinants of IBS in southwestern Iran, an area with a notable history of war.

Methods: We randomly enrolled 1849 permanent residents in 29 cities aged 20 to 65 years. A validated for Farsi version Rome III criteria and a questionnaire, including demographic data and health history, were administered to each subject. Participants who fulfilled the Rome III criteria were categorized into three groups: Diarrhea dominant (IBS-D), Constipation dominant (IBS-C), and Mixed type (IBS-M).

Results: The total prevalence of IBS was 3.2%, with 70% of subjects being of Arab descent ($P=0.004$). IBS was more common in females, singles, illiterate subjects, and people younger than 30 years; however, none of these differences were statistically significant. People with depression, anxiety, self-report of psychological disorders, and very low socioeconomic status had a significantly higher prevalence of IBS ($P<0.05$). After multivariable logistic regression analysis, very low socioeconomic status had an independent role in IBS predictivity (OR: 2.28, 95% CI: 1.01–5.15).

Conclusion: This study shows a higher prevalence of IBS symptoms in a population-based study in the region compared to counterparts in other regions of Iran. Considering the higher prevalence of self-reported psychological disorders, further studies are recommended to focus on the exact diagnosis of mental disorders and their influence on IBS.

Keywords: Iran, Irritable bowel syndrome, Mental disorders, Prevalence, Socioeconomic factors

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Introduction

Irritable bowel syndrome (IBS) is part of the spectrum of diseases commonly known as functional gastrointestinal disorders. In a meta-analysis conducted in 2012, the global prevalence was estimated to be around 11.2%.[1] In Iran, reports have varied from 1.1% to 10% in general-based surveys up to 25% in patients referred to gastrointestinal clinic.[2-5]

IBS is characterized by abdominal pain or discomfort, with alteration in bowel habits. The leading cause is unknown; however, it is believed to be a consequence of the interaction between altered bowel physiology and psychosocial components.[6] Bowel dysmotility, enhanced visceral hypersensitivity, changes in mucosal inflammatory function, alteration of bacterial growth, and changes in central-enteric nervous system regulation such as decreases in interleukin-10 (IL-10) are the most plausible causes.[7,8] Depression and anxiety are known psychological problems directly linked to the non-organic component of this syndrome.[9,10] Prevalence of anxiety disorders and major depressive disorder is estimated at 15.6% and 4.1%, respectively.[11,12]

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Due to the different presentations of IBS, diagnosis is made based on a number of criteria. The Rome III criteria consist of abdominal pain occurring three days per month in the last three months, with the onset six months prior to diagnosis and changes in stool frequency and form. Symptoms such as urgency in defecation, mucorrhea, bloating, and abdominal distention further support the diagnosis. The disease is categorized into four groups; IBS-C (constipation-predominant), IBS-D (diarrhea predominant), IBS-M (mixed diarrhea and constipation), and IBS-U (unclassified).[13] It is essential to distinguish IBS from more severe gastrointestinal disorders. Persistent healthcare seeking, and unnecessary medical tests or surgeries increase healthcare costs without improving the patients' status. The aim of this study is to report the IBS prevalence and its determinants in the Khuzestan province.

Materials and Methods

This study is a subset of a larger study conducted in the southwest region of Iran from October 2016 to November 2018.[14] This region of Iran was severely affected during the Iran-Iraq war. Previous studies have suggested links between psychological stress and IBS and other gastrointestinal disorders.

We included all permanent residents older than 20 years of age through Comprehensive Integrated health information system, and invited them randomly to participate in the survey. They had provided written informed consent, which was also informative about the program, and two questionnaires.

Sampling

We used multistage random sampling to identify participants in the survey in the large cross-sectional Khuzestan study. A total of 1079 clusters, including 780 urban and 299 rural clusters, were included in the survey. From among the 30 506 people who entered the Khuzestan study, 1853 (all of whom were able to speak Farsi) were randomly provided with an additional questionnaire regarding IBS and were therefore eligible for inclusion in this study.

Two questionnaires were used among the 1853 participants in this research. The first was a questionnaire assessing demographic data, education levels, anthropometric indices, smoking, opium and hookah use, and physical activity through International Physical Activity Questionnaire (IPAQ).[15] The questionnaire also included parts assessing socioeconomic status. This questionnaire regarding wealth state (designed and previously validated by the DDRI) was used to gain insight into socio-economic status. Any self-report of anxiety, depression, diabetes mellitus, systemic hypertension, and metabolic syndrome were asked, as well. The second was a validated Farsi version of the Rome III criteria to collect data of IBS symptoms.[16,17] It comprises a total of 21 questions regarding various clinical presentations that are used in the diagnosis or ruling out of IBS (Table S1). The Rome Criteria III was used for diagnosis of IBS, all of the criteria of which were present in the questionnaire.

Statistical Analysis

In order to clarify IBS determinants, we specified the frequencies of the variables and measured means and standard deviations, and evaluated the relations of qualitative variables between IBS and healthy subjects using the chi-square test. IBS patients were categorized into three groups of IBS-D, IBS-C, IBS-M. The association between quantitative variables such as age and BMI were explored with t-test, and one-way ANOVA was used to compare between IBS-subgroups. Wealth score index was calculated using multiple correspondence analysis based on a number of variables, including possession of home appliances, vehicles, and travel. We assessed univariate and multivariate logistic regression in variables with earlier significant association. All of the analyses were carried out with SPSS version 24. Statistical significance was declared if the P value was less than 0.05.

Results

A total of 1849 participants took part in this study. Of these, 63.5% were females and 36.5% were males. The mean age was 40.84 years with a standard deviation of 11.6.

The Rome III criteria were applied to identify IBS patients, and 60 subjects (3.2%) fulfilled the criteria.

Out of 60 patients, 27 (45%), 19 (31.7%) and 14 (23.3%) were classified as IBS-diarrhea dominant, IBS constipation dominant, and IBS mixed type subgroups, respectively.

We assessed ethnical variation, and found that 70% of subjects with IBS were Arabs, which was significantly higher in proportion to other ethnicities (P = 0.004). In evaluating other demographic variables, we recorded more IBS symptoms among females, persons younger than 30 years, the unmarried, those residing in rural areas, and illiterate people; however, none of these were found to be significant (Table 1).

Approximately 68% of patients reported alleviation of abdominal pain following bowel movement. Sixty-three percent reported incidents of loose, mushy, or watery stool in the past three months. Eighty-nine percent of IBS patients experienced incidents of straining, while 87% had experienced urgency in defecation. Fifty-eight percent of patients reported feeling bloated, most of whom fell into the category of IBS-D. IBS-D patients also reported abdominal distention and passing excessive gas more than other subgroups. The most frequent accompanying symptoms were straining, excess gas passage, abdominal distention, defecation urgency, and bloating.

Another finding of this study was an association between

Table 1. Demographic Characteristics in Subjects with or without Irritable Bowel Syndrome

Characteristics	Non-IBS	IBS	*P* value
Gender			
Male	623 (97.3)	17 (2.7)	0.29
Female	1166 (96.4)	43 (3.6)	
Age (y)			
<30	397 (95.7)	18 (4.3)	0.15
≥30	1392 (97.1)	42 (2.9)	
Marital			
Single	315 (96.6)	11 (3.4)	0.88
Married	1474 (96.8)	49 (3.2)	
Education			
Illiterate	255 (95.1)	13 (4.9)	0.12
Diploma	1297 (96.8)	43 (3.2)	
Academic	237(98.3)	4 (1.7)	
Physical activity			
Low-active	557 (96.4)	21 (3.6)	0.62
Medium-active	796 (97.2)	23 (2.8)	
High-active	428 (96.4)	16 (3.6)	
Ethnicity			
Fars	340 (98.8)	4 (1.2)	
Arab	842(95.2)	42 (4.8)	
Bakhtiari	442 (98)	9 (2)	0.004
Others	164 (97)	5 (3)	
BMI			
Normal	577 (96.2)	23 (3.8)	0.6
Overweight	677 (97.1)	20 (2.9)	
Obese	530 (96.9)	17 (3.1)	
Wealth state			
Very low	386 (95.1)	20 (4.9)	
Low	390 (95.8)	17 (4.2)	0.03
Medium	535 (97.4)	14 (2.6)	
High	468 (98.1)	9 (1.9)	
Area			
Urban	1445 (97)	45 (3)	0.26
Rural	344 (95.8)	15 (4.2)	
Opium			
Yes	19 (95)	1 (5)	0.48
No	1769 (96.8)	59 (3.2)	
Hookah			
Yes	62 (95.4)	3 (4.6)	0.46
No	1725 (96.9)	56 (3.1)	
Smoking			
Yes	127 (96.2)	5 (3.8)	0.61
No	1661 (96.8)	55 (3.2)	
Anxiety			
Yes	20 (80)	5 (20)	0.001
No	1769 (97)	55 (3)	
Depression			
Yes	38 (86.4)	6 (13.6)	0.002
No	1751 (97)	54 (3)	
Self-report of psychological disorder			
Yes	58 (87.9)	8 (12.1)	0.001
No	1729 (97.1)	52 (2.9)	
Metabolic syndrome			
Yes	524 (96.7)	18 (3.3)	0.9
No	1265 (96.8)	42 (3.2)	
Hypertension			
Yes	276 (95.8)	12 (4.2)	0.33
No	1513 (96.9)	48 (3.1)	
Diabetes mellitus			
Yes	219 (95.2)	11 (4.8)	0.16
No	1570 (97)	49 (3)	
Family history of colon cancer			
Yes	56 (83.6)	11(16.4)	<0.001
No	1731 (97.2)	49 (2.8)	

IBS, Irritable bowel syndrome; BMI, Body mass index.

very low socio-economic status and IBS in this population (P = 0.03). Also, surprisingly, no relation was found between tobacco and opioid use and the prevalence of IBS.

Patients were also questioned regarding psychological disorders. Patients with IBS reported anxiety and depression significantly higher than that observed in subjects without IBS (P = 0.001, 0.002, respectively). About 12.1% of patients who reported a history of psychological disorders fulfilled the IBS criteria, while among those without psychological disorders, this percentage was only 2.9% (P = 0.001).

In comparing IBS subgroups, age under 30 years had an independent effect on development of IBS in IBS-D patients (OR: 3.62, 95% CI: 1.59–8.25). Anxiety and self-report of psychological disorders were significantly higher in IBS-D patients (P = 0.004 and P = 0.002, respectively). This is while the other two groups (IBS-C and IBS-M) did not differ from healthy subjects in this regard. Also, increased depression compared to healthy subjects was exclusively seen among those suffering from IBS-M (P = 0.03) (Table 2).

Nearly 18.8% of Arabs were suffering from anxiety (P = 0.03). Even though non-Arabs reported a higher prevalence of depression (13% with P = 0.008), IBS was less common in them than Arabs. Among Fars ethnics, 1.2% suffered from IBS compared to 3.7% in all non- Fars ethnic groups (P = 0.01).

We designed two models to assess the predictive value of determinants. Depression, anxiety, self-report of psychological disorders, and ethnicity were added to the 1st model. Anxiety was seen as the only possible independent predictor, multiplying the risk of IBS by a value of 6.37 (95% CI: 1.05–38.96, P = 0.043). We added wealth score to the 2nd model, where it consequently erased the role of anxiety. Very low socio-economic status increased IBS by 2.28 times (95% CI 1.01–5.15, P = 0.04), and was found to be the principal individual predictive determinant of this study (Table 3).

Discussion

This is a population-based study assessing the prevalence and possible determinants of IBS in the Khuzestan area. Our findings demonstrated a prevalence of 3.2% for IBS symptoms in this population, which is higher than other population-based Iranian studies based on Rome II and III, including Shahrekord, Tehran, Firoozkooh and Damavand.[5] One study has reported a prevalence of 10.9% for IBS in Shiraz which is higher than our finding; however, given their use of Rome II criteria and wider time spectrum of diagnosis, it is not surprising that the prevalence is estimated higher than our current study.[18] The main result of this study is that higher prevalence of psychological disorders is not associated with IBS, whereas the economic situation may be implicated.

Psychological problems, such as mood and anxiety

Table 2. Psychiatric Disorders in Different Subcategories of Irritable Bowel Syndrome

Subcategories	Non-IBS No. (%)	IBS-D No. (%)	*P* Value	IBS-C No. (%)	*P* Value	IBS-M No. (%)	*P* Value
Age <30 y	397 (97.1)	12 (2.9)	0.006	5 (1.2)	0.59	1 (0.3)	0.32
Age ≥30 y	1392 (98.9)	15 (1.1)		14 (1)		13 (0.9)	
Anxiety (Yes)	20 (87)	3 (13)	0.004	1 (4.8)	0.2	1 (4.8)	0.15
Anxiety (No)	1769 (98.7)	24 (1.3)		18 (1)		13 (0.7)	
Depression (Yes)	38 (92.7)	3 (7.3)	0.21	1 (2.6)	0.34	2 (5)	0.03
Depression (No)	1751 (98.6)	24 (1.4)		18 (1)		12 (0.7)	
Self-report of psychological disorders (Yes)	58 (92.1)	5 (7.9)	0.002	1 (1.7)	0.47	2 (3.3)	0.07
Self-report of psychological disorders (No)	1729 (98.7)	22 (1.3)		18 (1)		12 (0.7)	

Table 3. Comparison of Risk Factors among IBS Patients

Risk Factors	Crude		Model 1*			Model 2**		
	Crude OR	95 % CI	Adjusted OR	*P* Value	95 % CI	Adjusted OR	*P* Value	95 % CI
Depression	5.1	2.0–12.6	5.4	0.09	0.7–38.9	5.5	0.09	0.7–39.9
Anxiety	8.0	2.9–22.2	6.3	0.04	1.0–38.9	5.1	0.07	0.8–31.6
Self-report of psychological disorders	4.5	2.0–10.0	0.6	0.66	0.06–5.6	0.6	0.73	0.07–6.3
Fars	0.3	0.1–0.8	Reference	Reference	Reference	Reference	Reference	Reference
Arab	2.6	1.4–4.5	0	0.99		0	0.99	
High socio-economic	—	—	—	—	—	Reference	Reference	Reference
Very-low socio-economic	—	—	—	—	—	2.2	0.04	1.01–5.1

*Model 1 is adjusted with depression, anxiety, self-report of psychological disorder, and ethnicity.
**In Model 2, the risk of IBS was assessed with wealth score, as well.

disorders, were found to be IBS-developing risk factors in several studies. In a study in 2019, anxiety and depression increased the odds of IBS in univariate analysis, but in adjusted models, the effect was not consistent and faded away.[19] In a review article including a total of 885 patients, anxiety was more common in IBS-C and IBS-D, while depression was more common in IBS-D.[10] The difference between this review and our study could be attributed to the patients' reports of psychological diseases. This is a limitation that should be resolved by specialist confirmation of each diagnosis. In conclusion, IBS-D patients probably suffered from psychological disorders more than other subcategories.

Various studies have suggested the role of sex and age in IBS, mostly implicating the female gender and being younger than 50 years of age to be positively associated with IBS.[18,20,21] However, this is still a controversial issue, since specific changes in prevalence of IBS were not seen in different ages among nearly 200 thousand subjects.[19] We did not report any difference in age and sex of participants; however, there were increased odds of contracting diarrhea-dominant IBS in subjects younger than 30 years. We should mention a particular limitation of the Rome criteria in this regard, mainly that it is not specific in distinguishing between constipation-dominant IBS and functional constipation,[22] which can be misleading in IBS-C diagnosis and estimating associated factors. It also has been suggested that increased literacy can lead to IBS; however, we did not find similar results.[20]

In our study population, poverty was the only independent predictive factor for IBS, regardless of age, gender, and psychological factors. This is a novel finding, which has not been hitherto recognized in the global pattern of IBS.[1] A post-infectious inflammatory process is suggested in IBS development; however, it is unclear whether poverty could be an affecting factor in this pathway.[23]

IBS was reportedly more common in obese subjects.[24,25] Although the aforementioned articles recorded increasing IBS prevalence with obesity, neither of them investigated the probably higher prevalence of psychological disorders in obese people. The present study had a small number of morbidly obese participants, making it impossible to assess the effect of obesity on IBS.

Ethnicity was a determinant of IBS in our crude analyses. Other studies have also suggested the possibility of differences in IBS prevalence among minor ethnicities in the Middle East,[26] lower socioeconomical status of Arab ethnics in this region due to probably fewer job opportunities is the main reason in this study that leads to more potential psychological disorders. Future studies could investigate the role of genetics in IBS development.

We found a positive colon cancer family history in 18% of patients with IBS. In a large cohort of approximately

39 000 participants, IBS increased the odds of colorectal neoplasms by about 1.21 times.[27]

The most important limitation of this study was its reliance on the Rome III criteria for IBS diagnosis. Due to the cross-sectional, self-report-based essence of this study, follow-up of the patients and ruling out other possible diagnoses were impossible. Further studies, aiming to rule out celiac disease, and measuring alterations in stool or occult blood are necessary.

In conclusion, IBS patients suffer from psychological disorders more than other people, and their susceptibility to these disorders should be accepted and confirmed by their health providers. Poverty can exacerbate the situation by enhancing anxiety or gastrointestinal infections. Further studies are suggested to evaluate IBS remission by alleviating socioeconomic status and psychological support.

Authors' Contribution

SA performing and interpreting the analysis, reviewing the literature, writing the paper. ZM and AASH supervising the project and reviewing the article before submission. LR reviewing the literature, writing the paper. BCH and SM performing the analysis. ZR, SAM, FA, MN and YP supervising the data gathering, reviewing the article before submission. HP designing, supervising and coordinating the program.

Conflict of Interest Disclosures

The authors declare that they have no conflict of interest.

Ethical Statement

This survey was approved by the ethics committee of National Institute for Medical Research Development (NIMAD) in ethic number of IR.NIMAD.REC 1394:002.

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Supplementary Materials

Supplementary file 1 contains Table S1.

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