

Risk factors, Psychosocial Correlates and Health-related Quality of Life in Nigerians with Irritable Bowel Syndrome: A Community-based Study

Abiodun Christopher Jemilohun¹, Kolawole Oluseyi Akande², Charles John Elikwu³, Oluwatoyin Adetutu Fasesan⁴, Olufunke Oluwatosin Adeleye⁵, Theophilus Oludare Ajiro⁶

1 Department of Medicine, Benjamin Carson Snr. School of Medicine, Babcock University, Ilisan-Remo, Ogun State, Nigeria;

2 Department of Medicine, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria;

3 Department of Medical Microbiology, Benjamin Carson Snr. School of Medicine, Babcock University, Ilisan-Remo, Ogun State, Nigeria;

4 Department of Medicine, Psychiatry Unit, Benjamin Carson Snr. School of Medicine, Babcock University, Ilisan-Remo, Ogun State, Nigeria;

5 Department of Medicine, Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria;

6 Department of Medicine, Babcock University Teaching Hospital, Ilisan-Remo, Ogun State, Nigeria.

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Correspondence to: Abiodun Christopher Jemilohun, Department of Medicine, Benjamin Carson Snr. School of Medicine, Babcock University, Ilisan-Remo, Ogun State, Nigeria.

Email: chrislohun2010@hotmail.com

Telephone: +2348038674623

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ABSTRACT

BACKGROUND: Irritable bowel syndrome (IBS) occurs worldwide and portends a huge socioeconomic burden to the individual and society. Though extensively investigated in some other regions, IBS has not been adequately studied in sub-Saharan Africa. We studied the prevalence of IBS, its risk factors and the health-related quality of life in a Nigerian community.

METHODS: We interviewed 515 consenting adults aged 18 - 70 years in a Nigerian community. We collected data from the participants with a composite questionnaire consisting of the Rome IV Functional Bowel Disorder questionnaire, the Becks Anxiety and Depression Inventories, the Pittsburgh Sleep Quality Index, the Early Trauma Inventory-Self Report, Short Form 12, version 2 Health Survey (SF-12v2) questionnaire and other relevant questions. Data analysis was done with appropriate statistical instruments.

RESULTS: We included 505 participants in the data analysis. Participants' mean age was 32.7 ± 12.9 years. The prevalence of IBS was 3.6% (95% CI = 2.0% - 5.3%). IBS had statistically significant relationship with anxiety [OR = 1.09 (1.03 - 1.15), $p = 0.002$] and low educational attainment [OR = 5.73 (95% CI, 1.52 - 21.61), $p = 0.010$]. The mean scores of the SF-12v2 8 scales, except vitality, were lower in subjects with IBS than the controls. The relationship was statistically significant in all the scales ($p \leq 0.05$), except general health and vitality.

CONCLUSION: IBS is positively associated with anxiety, low educational attainment and poor health-related quality of life. Clinicians need to pay attention to the mental health and quality of life of their patients with IBS.

Key words: Irritable bowel syndrome; Psychopathology; Anxiety; Depression; Health-related quality of life

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INTRODUCTION

Irritable bowel syndrome is defined as a functional bowel disorder (FBD) characterized by recurrent abdominal pain that is associated with defecation or a change in bowel habit in the absence of an identifiable organic etiology^[1,2]. Disordered bowel habits (diarrhea, constipation or a combination of the two) are usually present, as well as abdominal bloating/distention. Symptoms onset must have occurred at least 6 months before diagnosis and they must be present throughout the last 3 months before diagnosis.

The prevalence of IBS varies globally from one region of the world to another and from country to country. Majority of the community surveys that addressed the prevalence of IBS are from North America, Europe and Southeast Asia; few community studies originated from Africa^[3,4]. The prevalence of IBS within the community ranges from 10% to 25%^[3]. A meta-analysis revealed a pooled estimate of global IBS prevalence of 11.2% (95% CI, 9.8% -12.8%), with differences in prevalence between geographic regions; the lowest occurrence is in South Asia (7.0%) while the highest in South America (21.0%)^[4]. Substantial variation exists between these studies because of differences in methodology, sampling, and the use of diverse diagnostic criteria for defining IBS instead of biological markers^[4].

Just like the other functional gastrointestinal disorders, the pathophysiology of IBS is best understood in the context of the bio-psychosocial model of disease in which symptoms arise out of a complex interplay between abnormal gastrointestinal physiology and psychosocial factors that affect how an individual perceives, construes, and reacts to the altered gastrointestinal physiology.^[5] Several risk factors have been associated with IBS. These include a younger age; female gender; a family history of IBS; a previous history of physical, emotional or sexual abuse; prior intestinal infection; anxiety; psychological stress; depression; sleep disorders and dietary factors^[6]. Generally speaking, persons with psychological disorders have been observed to be more predisposed to developing symptoms of IBS and do have a more severe illness than control populations^[7-11]. Also, persons with IBS who seek medical care are more prone to anxiety disorder, major depression, hypochondriasis and panic disorder than those without IBS^[7-11].

IBS connotes a huge socioeconomic burden to the individual and the society because of its negative effect on the quality of life and the socio-economic worth of the patients through increased morbidity, work absenteeism, medical consultation rate, and healthcare cost^[12,13]. The estimated annual direct and indirect costs for functional digestive disorders, including IBS, is over \$41 billion (US dollars) in 8 of the most industrialized countries of the world^[14]. The estimated annual direct cost per-patient for IBS in the United States (US) ranges from \$1,562 to \$7,547 while the indirect costs ranges from \$791 to \$7,737 per year^[15]. In China, the estimated total annual cost of management per IBS patient is \$2933.08 while the total national cost of managing the disease is \$1.99 billion per annum^[16].

Health-related quality of life (HRQoL) evaluation is a vital outcome measure for patients with IBS. It affords an all-round assessment of the patient's physical, emotional, and social wellbeing. The American College of Gastroenterology recommends routine HRQoL screening in patients with IBS to allow a holistic assessment of the

impact and severity of the disease^[17]. There is ample evidence that IBS is strongly associated with low HRQoL, though the directionality of the relationship is still unclear. Patients with IBS could develop HRQoL deterioration because of their disease; it is also possible that some patients with reduced HRQoL later develop IBS^[17].

Two population-based IBS studies have been conducted in Nigeria: one a community-based^[18] and the other a nation-wide study^[19]. However, none of the two studies undertook a comprehensive evaluation of the possible risk factors and the health-related quality of life of IBS sufferers in the country. This study was, therefore, conducted to bridge the observed gaps. This is important in light of the fact that IBS has not been adequately investigated in the sub-Saharan African population.

METHODOLOGY

Study design

This study is part of a larger study, the methodology of which has been described in detail in the Ilisan-Remo Functional Bowel Disorder Project Protocol^[20]. It was a descriptive cross-sectional community-based study.

Sample size determination

We used the Leslie-Fischer formula ($n = Z^2pq/d^2$, with confidence interval set at 95%, p = Proportion, $q = 1.0 - p$, normal deviate $Z = 1.96$ and $d = 0.05$) to calculate the sample size. We used 32% as the proportion (the prevalence of IBS gotten from a previous Nigerian community-based study^[18]) to obtain 334 as the minimum sample size. After adjustment was made to compensate for incomplete or missing data with an anticipated response rate of 90% (0.9), the sample size increased to 382. This was rounded up to 500 to increase the power of the study.

Study population, location and selection criteria

The targeted population comprised of adults aged 18 to 70 years who resided in Ilisan-Remo, Ogun State, Southwest Nigeria at the time of the study. The community has a population that is a little above 10,000 people. We excluded pregnant women, persons with confirmed diabetes mellitus, history of abdominal surgery, unintentional weight loss, history of peptic ulcer disease, and bleeding per rectum.

Sampling method and data collection

Ilisan-Remo has 51 major streets out of which 10 streets were initially randomly selected by ballot. Two other streets were subsequently selected to complete the sample size. Consenting adults living in the households on each of the selected streets were interviewed by well-trained research assistants until the sample size was completed.

Data Instrument and Collection

We used a composite questionnaire containing demographic data, medication history, the Rome IV Functional Bowel Disorder questionnaire, the Becks Anxiety and Depression Inventories, the Pittsburgh Sleep Quality Index, the Early Trauma Inventory-Self Report, Short Form 12, version 2 Health Survey (SF-12v2) questionnaire and other relevant questions. The participants were shown a copy of the Bristol Stool Scale for easy assessment of stool form.

Waist Circumference

Participants' abdominal girth (in centimeter) was measured with a flexible tape rule at the level of the umbilicus as a measure of abdominal obesity.

Assessment of Irritable Bowel Syndrome

We assessed IBS with the Rome IV FBD modular questionnaire^[2].

Irritable Bowel Syndrome Diagnostic Criteria*^[1].

Recurrent abdominal pain, occurring at least 1 day per week in the last 3 months, associated with 2 or more of the following criteria: (1) Related to defecation; (2) Associated with a change in stool frequency; (3) Associated with a change in stool form (appearance).

*Criteria satisfied for the last 3 months with symptom onset at least 6 months prior diagnosis.

IBS is further classified into four subgroups by Rome IV: IBS-Diarrhea (IBS-D), IBS-Constipation (IBS-C), IBS-Mixed (IBS-M), IBS-Unclassified (IBS-U).

IBS can be reasonably diagnosed using the Rome IBS criteria so long as the patient has no alarm features such as a history of digestive surgery, a history of organic bowel disease, severe weight loss, bloody stool, or nocturnal abdominal pain, anemia^[21,22].

Assessment of anxiety

We assessed anxiety in the subjects with the Beck Anxiety Inventory (BAI). The Beck Anxiety Inventory was designed by Beck *et al.* in 1988 as a screening tool for anxiety.^[23] The instrument is a 21-item self-reported inventory with statements descriptive of anxiety symptoms experienced by subjects in the past week of their lives, rated on a 4-point Likert scale. The possible range of total scores is between 0 to 63. The higher the score the higher the degree of anxiety (0 - 21 = low anxiety, 22 - 35 = moderate anxiety, 36 and above = potentially concerning levels of anxiety). It takes 5 to 10 minutes to complete the inventory.

Assessment of depression

We assessed depression in the subjects with the Beck Depression Inventory (BDI-II) respectively. The Beck Depression Inventory (BDI) was designed by Beck *et al.* in 1961 for the assessment of depression^[24]. It is a 21-question multiple-choice self-report inventory with a score range of 0-63. It has undergone two revisions since it was created: the BDI- the original version, first published in 1961; the BDI- 1A, first revision in 1978; and the BDI-II, second revision in 1996. The BDI is extensively used by healthcare professionals and researchers as an assessment tool for depression in a variety of settings. Higher scores represent higher degrees of depression: (0 - 13 = minimal depression, 14 - 19 = mild depression, 20 - 28 = moderate depression and 29 - 63 = severe depression).

Assessment of Early Trauma Exposure

We assessed exposure to early life trauma with the short form, self-report version of Bremner's Early Trauma Inventory (ETISR-SF)^[25]. The instrument, which has been validated for the assessment of exposure to traumatic experiences prior age 18 years, contains 27 'true' or 'false' items. The inventory is divided into four scales measuring: general trauma (11 items), physical punishment (5 items), emotional abuse (5 items), and sexual abuse (6 items). A total score, and the sub-scale scores, are generated by summing the number of positive responses. The higher the score the worse the early trauma experienced by the person.

Assessment of sleep quality

We assessed sleep quality with the Pittsburgh Sleep Quality Index (PSQI). It is an effective instrument used in measuring sleep quality and patterns in adults. It measures seven components to discriminate "poor" from "good" sleep quality: subjective sleep quality, sleep latency, sleep duration, sleep disturbances, habitual sleep efficiency, use of

sleeping medications, and daytime dysfunction over the last month^[26]. A total score of ≥ 5 or more is indicative of poor sleep quality.

Assessment of Health-related Quality of Life

We assessed the health-related quality of life (HRQoL) of the participants with the Medical Outcomes Study Short Form-12 Version 2 (SF-12v2). The instrument is an abridged version of the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36)^[27]. The SF-12v2 is a generic 12-item self-reported HRQoL that scores patients on a graduated scale based on a 4-week recall^[27]. The SF-36 and SF-12v2 generate the Physical Component Summary (PCS12) and the Mental Component Summary (MCS12) of patients' HRQoL. Besides, they generate patients' profile across 8 subscales: Physical Functioning (PF), Role Physical (RP), Bodily Pain (BP) General Health (GH), Vitality (VT), Social Functioning (SF), Role Emotional (RE), Mental Health (ME). The PCS12 and MCS12 measure the latent concepts of physical and mental HRQoL respectively. Each of the components is scored on a scale from 0 to 100 with a mean of 50 and a standard deviation of 10, where the higher scores represent better health (a brief description of each of the domains can be found in Table 1). The SF-36 family of instruments has been proven to be a reliable and valid measure of health-related quality of life in over 40 different countries and among various cultures, including countries in sub-Saharan Africa^[28].

Physical examination and stool test

Participants who fulfilled the diagnostic criteria for IBS were invited by phone call for general physical examination. Stool microscopy, culture and sensitivity was done to exclude infectious etiology. The procedure was performed according to standard microbiology methods.

Statistical Analysis

We analyzed data with the IBM-Statistical Package for Social Sciences (SPSS), version 22. Participants who were positive for IBS were the cases while participants who had no IBS were the controls. Continuous variables were presented as means \pm SD and range. Means were compared with the Independent Student t-test where appropriate. Categorical variables were expressed as frequencies and percentages. We compared differences between categorical variables by means of Pearson Chi-square test or Fisher exact test as occasion required. The unadjusted odds ratios of prospective risk factors of IBS were calculated by univariate analysis where appropriate. We used binary logistic regression to eliminate the effect of confounders on the risk factors that were found to be significant during univariate analysis to get the adjusted odds ratios. We considered variables with odds ratio (OR) > 1 and P-value ≤ 0.05 as significant.

Ethical consideration

We obtained clearance from the institutional Ethics Review Board. Written informed consent was obtained from all the participants.

RESULTS

A total of 515 persons were eventually interviewed. Ten among them were excluded from the data analysis because of incomplete data entry, leaving 505 (98.1%) participants (Table 2). The mean age of the participants was 32.7 ± 12.9 years. There was no significant difference between the mean ages of the participants with IBS and the controls. There were 260 (51.5%) females while the remaining participants were males. There were 284 (56.2%) unmarried participants

while the others were married. Regarding the educational attainment of the participants, 250 (49.5%) had tertiary education, 198 (38.9%) had secondary education while 57 (11.3%) either had primary or no formal education. Fifty participants (9.9%) smoked cigarette while 139 (27.8%) consumed alcohol. The mean waist circumference of the participants was 82.0 ± 14.6 cm.

Amongst the 505 participants, 18 [3.6% (95% CI = 2.0% - 5.3%)] fulfilled the diagnostic criteria for IBS (Table 2). Of the 18 with IBS, 6 (33.3%) had IBS-U subtype, 5 (27.8%) had IBS-M, 4 had IBS-C while 3 (16.7%) had IBS D. Those with IBS were more likely to have low educational attainment ($p = 0.013$), smoke cigarette (P -value = 0.025) and consume alcohol (P -value = 0.033). Also, 13 (72.2%) participants with IBS were under 51 years, though this was not statistically significant.

Concerning the psychological factors, participants with IBS had a higher mean anxiety score than the controls with statistical significance (P -value = 0.006) (Table 2). Individuals with IBS also had a higher mean depression score than the controls with statistical significance (P -value = 0.051). Moreover, a higher proportion of those with IBS had severe symptoms of depression compared to the controls (16.5% vs 5.3%) with statistical significance (P -value = 0.043). Though the mean early trauma score of those with IBS was higher than that of the controls (9.3 ± 6.6 vs 7.1 ± 5.0), the relationship was not statistically significant ($p = 0.067$). There was no statistical difference between the mean sleep quality scores of the two groups of participants ($p = 0.327$). However, a higher proportion of participants with IBS had poor sleep scores than those without IBS (61.1% vs 44.1%), though without statistical significance ($p = 0.227$).

On univariate analysis, IBS was positively associated with low level educational attainment [OR = 5.77 (1.69 - 19.62), $p = 0.005$], cigarette smoking [OR = 2.38 (0.66 - 8.60), $p = 0.015$], alcohol consumption [OR = 1.78 (0.58 - 8.60), $p = 0.036$], and depression [OR 1.02 (0.89 - 1.07), $p = 0.003$] (Table 3). After adjustment for confounders with multivariate analysis, both low level educational attainment [OR = 5.73 (95% CI, 1.52 -21.61), $p = 0.010$] and anxiety [OR = 1.09 (1.03 - 1.15), $p = 0.002$] retained the positive association while the others did not.

The means of SF-12v2 scale scores for subjects with IBS were compared with the controls (Table 4). The mean scores of the scales except vitality were lower in subjects with IBS than the controls. The relationship was significant in all ($p \leq 0.05$), except general health ($p = 0.077$) and vitality ($p = 0.164$).

The largest differences in the means were obtained in Physical Functioning, Role Physical, Bodily Pain and Role Emotional (Figure 1). The mean Physical Component Summary and Mental Health

Summary scores were also less in participants with IBS than in the controls, though only PCS was statistically significant ($p < 0.001$).

DISCUSSION

The prevalence of IBS varies widely from one population group to another^[4,29]. The prevalence of 3.6% obtained in this study is lower than the global prevalence [11.2% (95% CI, 9.8% -12.8%)]^[4]. It is also lower than the previous two Nigerian population-based studies earlier cited which obtained a prevalence of 31.6% in the community study and a prevalence of 12.2 % in the nationwide study^[18,19]. However, a closer look at the nationwide study shows that there is a considerable disparity in IBS rates among the various regions of the country with the North having a significantly higher prevalence than the South in general. In the nationwide study, the Southwest region where Ilisan-Remo is situated had the lowest prevalence (3.3%) while the Northcentral region where the previous community study was conducted had the highest prevalence (34.1%)^[19]. These findings show a consistency in the IBS rates obtained from the population-based studies that have been conducted in Nigeria.

Reasons that have been adduced to the wide global disparity observed in the prevalence of IBS include differences in study design, the prevailing local risk factors, and the diversity in the type of survey instruments used in conducting the studies.^[3] The Rome iterations have been generally observed to have lower prevalence estimates than the Manning criteria^[3,30]. The Rome IV criteria have also been found to have lower rates than the Rome III, with 73.5% to 87% of Rome III patients meeting Rome IV criteria^[31,32,33,34]. The reason for this observation could be the more stringent criteria of

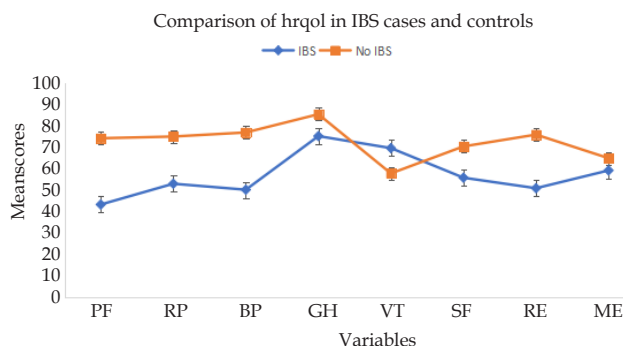


Figure 1 Means of SF-12v2 scale scores for subjects with IBS and controls. HRQoL: Health-related Quality of Life; PF: Physical Functioning; BP: Bodily Pain; GH: General Health; VT: Vitality; SF: Social Functioning; RE: Role Emotional; MH: Mental Health.

Table 1 SF-12v2 Health-related quality of Life Domains^[27].

Domain	Description
Physical Functioning	Degree to which health limits regular (moderate) activities such as moving table, housecleaning and climbing several flights of stairs
Role Physical	Degree to which physical health limits work or other regular activities
Bodily Pain	Degree to which pain interferes with normal work both outside and at home
General Health	General health perception
Vitality	Rating of energy level
Social Functioning	Degree to which physical or emotional health interferes with social activities
Role Emotional	Degree to which emotional health interferes with work and other activities
Mental Health	Rating of emotional wellbeing
Physical Component Summary	Focuses on subject's general overall health, limitations in mobility, work, and other physical activities as well as limitations due to pain
Mental Component Summary	Focuses on subject's limitations in social activity, emotional state, and level of distraction.

Rome IV which requires abdominal pain that must have occurred at least once a week for 3 months as against abdominal pain/discomfort occurring at least 3 times a month for the same period in the Rome III^[1]. The reason for the North-South dichotomy of IBS prevalence in Nigeria is not clear and needs further investigation but environmental factors, especially diet, could play a role since food is a common precipitant of IBS symptoms^[19,35]. Moreover, foods that contain short-chain carbohydrates that are poorly absorbed in the small intestine, known as FODMAP (fermentable oligosaccharides, disaccharides, monosaccharides and polyols), do precipitate IBS symptoms^[36]. Common staples in the two regions differ because of climatic differences. Whereas the traditional staples in the Nigerian Northern region include local dairy products and grains such as sorghum, sesame, guinea corn, millet and rice; tubers like yam, cassava, cocoyam and their products dominate the Southern diet.

We found no significant gender difference in the prevalence of IBS in our study. IBS rates in women range from 1.5- to 3-fold higher than those seen in men^[3]. Though the global female gender preponderance of IBS exists regardless of the diagnostic criteria used, the rates in males are much closer to females, and in some cases higher in Africa, South America, and South Asia^[3,37]. This observation could be a reflection of the gender differences in the health-seeking behavior and symptoms normalization in these regions.

Majority of the study participants with IBS (72.2%) were less than 50 years of age, though without statistical significance. Despite that IBS occurs in all age groups, it has been noted that about half of patients report having their first symptoms prior age 35 years^[3]. The prevalence is also 25% lower in those above 50 years than in those who are younger^[4]. This observation might be an indication of symptoms remission over time as against the wrong notion that IBS is a chronic long-life condition.

In this study, univariate analysis showed that subjects with IBS are more likely to have anxiety and depression than the controls, though only anxiety sustained the relationship after multivariate analysis. Previous studies from Nigeria have also found IBS to be positively associated with depression and anxiety^[18,38,39]. There is ample evidence from the literature that over fifty percent of individuals suffering from IBS report anxiety or depression with the attendant experience of more severe somatic symptoms^[3]. Persons with psychological disorder are generally more prone to developing IBS and do have a more severe illness than non-IBS controls^[7-11]. However, it is uncertain if psychopathology is the cause of IBS or vice versa^[40].

Our study found a significant positive association between IBS and low-level educational attainment. Educational attainment could be a proxy for socioeconomic status since there is a direct correlation between people's level of education and their quality of life^[41]. Studies conducted to determine IBS association with socioeconomic status have yielded conflicting results^[3]. Drossman *et al*^[42]. found IBS to be associated with lower socioeconomic status. Ford *et al*^[43]. also found that lower socioeconomic status in adults was associated with a higher likelihood of the onset of IBS in a 12 year follow up of adults. Contrary to these studies, some studies suggest that high socioeconomic status in childhood, using as a proxy the number of persons per room^[44] or parental socioeconomic class is associated with IBS^[45]. Nevertheless, lower socioeconomic status is positively associated with increased rates of comorbid depression and anxiety in patients with IBS^[46].

IBS patients had significantly lower scores in all the SF12v2 scales except general health and vitality in our study. Generally, it has been observed that patients with IBS tend to have lower HRQoL compared with control populations. Two studies conducted with SF-36

Table 2 Demographic and psychosocial characteristics of participants (n = 505).

Variables	Total	IBS	No IBS	P-value
Age in years [Mean (SD)]	32.7 (12.9)	36.1 (16.4)	32.6 (12.8)	0.38
Age group in years [n (%)]				0.308
≤ 20	79 (15.5)	2 (11.1)	77 (15.8)	
21 - 30	210 (41.6)	8 (44.4)	202 (41.5)	
31 - 40	100 (19.8)	3 (16.7)	97 (19.9)	
41 - 50	50 (9.9)	0 (0.0)	50 (10.3)	
≥ 51	66 (13.1)	5 (27.8)	61 (12.5)	
Gender [n (%)]				0.34
Male	245 (48.5)	11 (61.1)	234 (48.0)	
Female	260 (51.5)	7 (38.9)	253 (52.0)	
Waist circumference in cm [Mean (SD)]	82.0 (14.6)	78.8 (13.5)	82.2 (14.7)	0.335
Marital Status [n (%)]				0.34
Unmarried	284 (56.2)	8 (44.4)	276 (56.7)	
Married	221 (43.8)	10 (55.6)	211 (43.5)	
Education [n (%)]				0.013
Nil/Primary	57 (11.3)	6 (33.3)	51 (10.5)	
Secondary	198 (39.2)	7 (38.9)	191 (39.2)	
Tertiary	250 (49.5)	5 (27.8)	245 (50.3)	
Cigarette smoking [n (%)]				0.025
No	455 (90.1)	13 (72.2)	442 (90.8)	
Yes	50 (9.9)	5 (27.8)	45 (9.2)	
Alcohol intake [n (%)]				0.033
No	366 (72.5)	9 (50.0)	357 (73.3)	
Yes	139 (27.5)	9 (50.0)	130 (26.7)	
Coffee intake [n (%)]				0.79
No	364 (72.1)	12 (66.7)	352 (72.3)	
Yes	141 (27.9)	6 (33.3)	135 (27.7)	
Physical exercise				0.334
No or < once a week	419 (83.0)	17 (94.4)	402 (82.5)	
≥ once a week	86 (17.0)	1 (5.6)	85 (17.5)	
Anxiety [Mean (SD)]	8.3 (9.6)	15.2 (14.4)	8.1 (9.3)	0.006
Anxiety [n (%)]				<0.001
Low (0 -21)	457 (90.5)	11 (61.1)	446 (91.6)	
Moderate (22 -35)	45 (8.9)	6 (33.3)	39 (8.0)	
High (≥ 36)	3 (0.6)	1 (5.5)	2 (0.4)	
Depression [Mean (SD)]	8.3 (9.6)	15.2 (14.4)	8.1 (9.3)	0.051
Depression [n (%)]				0.043
Minimal (0 - 13)	392 (77.6)	10(55.6)	382(78.4)	
Mild (14 - 19)	42(8.3)	3(16.7)	39(8.0)	
Moderate (20 - 28)	42(8.2)	2(11.1)	40(11.1)	
Severe (29 - 63)	29(5.7)	3(16.7)	26(5.3)	
Early Trauma [Mean (SD)]	7.1 (5.1)	9.3 (6.6)	7.1 (5.0)	0.067
Sleep Quality [Mean (SD)]	4.5 (3.0)	5.2 (3.0)	5.2 (3.4)	0.327
Sleep Quality [n (%)]				0.227
Good (≤ 4)	279 (55.2)	7 (38.9)	272 (55.9)	
Poor (≥ 5)	226 (44.8)	11 (61.1)	215 (44.1)	
Total [n (%)]	505 (100)	18 (3.6)	487 (96.4)	

IBS: irritable bowel syndrome; SD: standard deviation.

in the US to determine the impact of IBS on HRQoL showed that IBS patients had significantly worse scores in all the 8 scales in one study^[47] and 7 of the scales in the other study^[48] compared with the US general population. Patients with IBS also had significantly lower scores on varying numbers of scales compared with patients with

Table 3 Unadjusted and adjusted odds ratios of risk factors for IBS (n = 505)

Variable	Total	IBS (n = 18)	No IBS (n = 487)	Unadjusted Odds Ratio	P value	Adjusted Odds Ratio	P value
Age [Mean (SD)]	32.7 (12.9)	36.1 (16.4)	32.6 (12.8)	1.02 (0.99 - 1.05)	0.261		
Gender [n (%)]					0.281		
Male	245 (48.5)	11 (61.1)	234 (48.0)	1(Reference)			
Female	260 (51.5)	7 (38.9)	253 (52.0)	0.59 (0.22 - 1.54)			
Level of Education [n (%)]					0.016		0.035
Tertiary	250 (49.5)	5 (27.8)	245 (50.3)	1 (Reference)		1 (Reference)	
Secondary	198 (38.2)	7 (38.9)	191 (39.2)	1.80 (0.56 - 5.75)	0.324	2.17 (0.64 - 7.36)	0.215
Nil/Primary	57 (11.3)	6 (33.3)	51 (10.5)	5.77 (1.69 - 19.62)	0.005	5.73 (1.52 - 21.61)	0.01
Waist circumference [Mean (SD)]	82 (14.6)	78.8 (13.5)	82.2 (14.7)	0.98 (0.95 - 1.02)	0.333		
Cigarette smoking [n (%)]					0.015		0.185
No	455 (90.1)	13 (72.2)	442 (90.8)	1 (Reference)		1 (Reference)	
Yes	50 (9.9)	5 (27.8)	45 (9.2)	3.8 (1.29 - 11.09)		2.38 (0.66 - 8.60)	
Alcohol intake [n (%)]					0.036		0.312
No	366 (72.5)	9 (50.0)	357 (73.3)	1 (Reference)		1 (Reference)	
Yes	139 (27.5)	9 (50.0)	130 (26.7)	2.75 (1.07 - 7.07)		1.78 (0.58 - 8.60)	
Coffee intake [n (%)]					0.603		
No	364 (72.1)	12 (66.7)	352 (72.3)	1 (Reference)			
Yes	141 (27.9)	6 (33.3)	135 (27.7)	1.30 (0.48 - 3.54)			
Physical exercise							
No or < once a week	419 (83.0)	17 (94.4)	402 (82.5)	1 (Reference)	0.217		
≥ Once a week	86 (17.0)	1 (5.6)	85 (17.5)	0.28 (0.04 - 2.12)			
Anxiety [Mean (SD)]	8.6 (8.2)	16.9 (11.6)	8.3 (7.9)	1.10 (1.05 - 1.15)	< 0.001	1.09 (1.03 - 1.15)	0.002
Depression [Mean (SD)]	8.3 (9.6)	15.2 (14.4)	8.1 (9.3)	1.06 (1.02 - 1.10)	0.003	1.02 (0.98 - 1.07)	0.354
Early Trauma [Mean (SD)]	7.1 (5.1)	9.3 (6.6)	7.1 (5.0)	1.09 (0.99 - 1.19)	0.071		
Sleep Quality [Mean (SD)]	4.5 (3.0)	5.2 (3.0)	5.2 (3.4)	1.08 (0.93 - 1.25)	0.328		

IBS: Irritable bowel syndrome.

gastroesophageal reflux disease, end-stage kidney disease, diabetes mellitus, asthma, and migraine patients in the studies. In some cases, HRQoL decrease in patients with IBS can be significantly raised to increase suicidal risk behavior. Therefore, clinicians need to actively lookout for potential suicidal behavior in IBS patients with severe symptoms and intervene when the need arises^[17].

CONCLUSION

This study shows that IBS is positively associated with anxiety and low educational attainment which could be a proxy for low socio-economic status. It also shows that IBS is positively associated with poor HRQoF which has been observed in other populations. It brings to the fore the need for clinicians to pay adequate attention to the mental health of their patients with IBS. Routine HRQoL screening is also needed because HRQoL decrements are fairly common in IBS patients. Appropriate treatment should be initiated when IBS symptoms are found to diminish functional status and reduce the overall HRQoL.

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Table 4 Mean scores of SF-12v2 scales in subjects with IBS and controls (n = 505).

Variables	Total	IBS (n = 18)	No IBS (n = 497)	P-value
Physical Functioning	72.9 (32.1)	43.1 (33.0)	74.0 (31.6)	<0.001
Role Physical	74.0 (29.9)	52.8 (28.9)	74.8 (29.7)	0.002
Bodily Pain	75.7 (24.9)	50.0 (28.4)	76.7 (24.2)	<0.001
General Health	84.8 (15.7)	75.0 (22.8)	85.2 (15.3)	0.077
Vitality	58.0 (35.4)	69.4 (31.6)	57.6 (35.5)	0.164
Social Functioning	69.7 (30.1)	55.6 (36.0)	70.2 (29.8)	0.043
Role Emotional	74.9 (29.5)	50.7 (29.2)	75.7 (29.2)	<0.001
Mental Health	64.5 (19.4)	59.0 (15.3)	64.7 (19.6)	0.022
PCS	50.2 (7.7)	41.6 (7.8)	50.5 (7.5)	<0.001
MCS	46.2 (8.9)	44.2 (7.8)	46.3 (8.9)	0.324

IBS: Irritable bowel syndrome; PCS: Physical Component Summary; MCS: Mental Component Summary.

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