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An Analytical Study of Clinical, Demographic, and Laboratory Factors in Irritable Bowel Syndrome

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Abstract

Irritable bowel syndrome (IBS) is one of the most prevalent functional gastrointestinal conditions. Food and lifestyle factors may contribute to symptom presentation in susceptible individuals. This study determined the prevalence of irritable bowel syndrome and its types among Iraqi citizens using a cross-sectional descriptive survey conducted at Baquba Teaching Hospital. The study included 92 individuals with IBS, consisting of 32 men and 60 women, between August 2025 and January 2026. Convenience sampling was employed. The prevalence was higher among women, who represented 65.22% of the study group. Low income, educational level, and occupational status were also considered possible associated factors in the presentation of irritable bowel syndrome. In the Iraqi population examined in this study, irritable bowel syndrome appeared to be relatively less common compared with some other reported populations. Female gender, low family income, and employment status showed the strongest associations with IBS. Community-based studies may provide an opportunity to discuss dietary goals, educational differences, and preventive health strategies related to IBS.

Keywords: irritable bowel syndrome, clinical factors, demographic factors, laboratory parameters, Iraqi population

1. INTRODUCTION

Inflammation of the colon, or large intestine, is referred to as colitis [1]. To provide a clearer understanding of colitis, this study discusses its symptoms, causes, diagnostic techniques, and available treatments [2]. This inflammation may occur for several reasons and may cause a variety of symptoms that can significantly affect a person's quality of life. Therefore, it is important for both patients and healthcare professionals to understand the various forms of colitis, their causes, and the ways in which they are diagnosed and managed. There are two primary forms of microscopic colitis: lymphocytic colitis and collagenous colitis. Both are characterized by chronic watery diarrhea without apparent inflammation on colonoscopy. Microscopic colitis mainly affects older persons and may be associated with autoimmune diseases [2, 3].

Inflammatory bowel disease (IBD) is a group of inflammatory gastrointestinal (GI) disorders classified into two major types: ulcerative colitis (UC) and Crohn's disease (CD) [1]. There are limited published data on the initial presenting symptoms of patients with IBD. Little is known about whether specific symptoms occur together or whether specific symptom phenotypes correlate with underlying disease classification. Prominent symptoms in CD often include abdominal pain, diarrhea, weight loss, and fatigue [2, 3]. One study examined symptoms throughout the disease course of IBD and found that diarrhea and fatigue were the two most common symptoms [4]. However, that study did not explore symptoms at initial disease presentation. Another study described clinical characteristics, incidence, natural history, and symptomatic presentation before diagnosis in a pediatric population, but it focused on extraintestinal manifestations (EIMs) of IBD at the time of diagnosis. The two most common EIMs at presentation were joint pain, reported in 20% of CD patients and 14% of UC patients, and oral ulcerations, reported in 13% of CD patients and 6% of UC patients [5]. Other studies have explored symptoms associated with IBD after diagnosis had already been established, usually later in the disease course [6, 7, 8, 9, 10, 11]. Therefore, this study sought to examine symptom frequency and patterns at the time of IBD diagnosis. In addition, it aimed to explore whether certain symptoms occurred more commonly together and whether such associated symptom clusters were found in either CD or UC.

2. METHODS

The Ocean State Crohn's and Colitis Area Registry (OSCCAR) is a community-based prospective IBD inception cohort established in Rhode Island, with recruitment occurring between 2008 and 2013. A total of 408 patients were enrolled in the registry. Rhode Island was selected because it is both a small and diverse state. The purpose of the OSCCAR cohort was to improve understanding of IBD epidemiology, clinical presentation, disease course, and outcomes [12]. Newly diagnosed adult and pediatric IBD patients residing in Rhode Island were referred for OSCCAR enrollment by their gastroenterologist or colorectal surgeon [12]. Diagnoses of UC, CD, and indeterminate colitis were confirmed using symptom, endoscopic, radiologic, and histologic criteria established by the National Institutes of Diabetes and Digestive and Kidney Diseases (NIDDK) IBD Genetic Consortium [13]. At the time of initial intake, an extensive interview and chart review were performed to collect demographic and clinical data.

The two main forms of inflammatory gastrointestinal illnesses that make up IBD are Crohn's disease and ulcerative colitis [1]. The initial symptoms presented by IBD patients are not well documented. It is unclear whether certain symptoms coexist or whether certain symptom phenotypes are associated with the underlying disease category. Abdominal pain, diarrhea, weight loss, and fatigue are common CD symptoms [2, 3]. Fatigue and diarrhea were reported as the two most prevalent symptoms in one study that examined symptoms throughout the course of IBD [4]. Nevertheless, symptoms at disease onset were not examined in that study. Another study focused on extraintestinal manifestations of IBD at the time of diagnosis, but it also documented clinical features, occurrence, natural history, and symptoms in a juvenile population before diagnosis. Oral ulcers and joint pain were the two most prevalent EIMs at presentation [5]. Other research has examined IBD symptoms after diagnosis, usually later in the course of illness [6, 7, 8, 9, 10, 11].

At enrollment, a prospective 41-item comprehensive symptom assessment was used to record symptoms experienced during the four weeks before IBD diagnosis. This symptom inventory was previously developed from IBD severity indices, including the Mayo Index [14], UCDAI [15], Seo Index [16], Ulcerative Colitis Clinical Score [17], and Simple Clinical Colitis Activity Index [18]. The Montreal classification [19] was used to define disease location. Patients who did not complete the symptom assessment, had indeterminate colitis, or had inadequate information to support an IBD diagnosis were excluded.

Biopsy samples were also obtained, and questionnaires were completed to measure the degree of IBS-like symptoms in each participant in a proposed case-control investigation involving individuals with quiescent IBD or IBS, including eighteen UC patients, and healthy controls undergoing ileocolonoscopy [20]. Infiltration of pro-inflammatory cells, such as eosinophils, intraepithelial lymphocytes, and mast cells, was evaluated in biopsy tissues. CD-117 and CD-3 were assessed using immunohistochemistry. Tumor necrosis factor (TNF)-α levels and colonic paracellular permeability were quantified. The messenger RNA (mRNA) expression of tight junction proteins, including ZO-1, α-catenin, and occludin, was also assessed. The authors found that UC patients with IBS-like symptoms had greater paracellular permeability than those

without such symptoms. They also found that IBS patients had paracellular permeability comparable to that of patients with quiescent UC who had IBS-like symptoms, while quiescent UC patients without IBS-like symptoms had paracellular permeability comparable to that of controls.

Enhanced paracellular permeability and decreased tight junction protein mRNA expression were generally linked to IBS-like symptoms. Intraepithelial lymphocytes were found in greater quantities, and mast cell infiltrates were greater in the IBS and UC groups compared with the control group and other IBD groups. This finding suggests that subclinical inflammation may be involved in the etiology of these symptoms, especially since TNF-α mRNA expression was higher in the subgroup of IBD patients with IBS-type symptoms [21].

Visceral afferent hypersensitivity may also result from the persistent and recurrent mucosal inflammation of UC. Because of abnormal neural responses that result in hyperalgesia and allodynia, as well as abnormal local reflexes and altered GI motility and secretion, this may ultimately generate symptoms consistent with IBS. Evidence for this has been reported in a rat model of colitis and, more recently, in a barostat study involving patients with UC in remission. Rectal sensory thresholds and IBS-like symptoms were found to be positively correlated in the latter study. In addition, the study revealed that UC patients had more mast cells in the colonic mucosa and a larger percentage of these cells near nerve fibers than the healthy control group; Barbara et al. had previously reported a similar finding for IBS patients [19].

Several studies included in the previously mentioned meta-analysis [21] also showed that IBS-like symptoms had a negative effect on the quality of life and mood of IBD patients. Both IBD and IBS are associated with stress, anxiety, and depression [22]. However, the effect of psychological comorbidity on the natural history of these diseases remains a matter of debate. In the past, healthcare providers believed that UC was a disorder limited to the colon and rectum, whereas IBS was a centrally mediated process.

Current evidence suggests that the relationship between disease activity and stress-related flare-ups in both disorders may be more complex and that psychological comorbidity is associated with more severe symptoms and more frequent disease activity flare-ups in both conditions [23, 24].

One proposed explanation is that psychological comorbidity produces a stress response that may exacerbate these diseases. The hypothalamus, amygdala, and hippocampus are among the interrelated brain regions involved in this stress response. The hypothalamic-pituitary axis and the autonomic nervous system are activated as a result of communication between these regions.

The zona fasciculata of the adrenal cortex secretes more glucocorticosteroids when the hypothalamic-pituitary axis is activated, whereas the adrenal medulla secretes more norepinephrine and adrenaline when sympathetic autonomic activity increases. This interaction among endocrine pathways, the enteric nervous system, and descending autonomic neurons is commonly referred to as the brain-gut axis [22, 25].

It is believed that the spinothalamic, spinoreticular, and spinomesencephalic tracts are involved in the sensation of visceral pain [26]. Interestingly, the limbic system, which mediates emotional reactions, is also a major coordinating center for these pathways. This supports the idea that both physiological and psychological pathology play a role in the development of functional GI symptoms in IBS and UC. It follows that visceral hypersensitivity, psychological health, stress, anxiety, and depression symptoms are connected, and that mood may influence the development and perception of symptoms.

Longitudinal follow-up studies indicate that individuals without mood disorders who report GI symptoms consistent with IBS at baseline may be more likely to experience anxiety or depression later. These studies have also indicated that individuals who exhibit anxiety or depression at baseline, but do not exhibit GI symptoms, are more likely to develop GI symptoms de novo.

This bidirectional effect of the brain-gut pathway observed in functional GI disorders raises the possibility that the brain-gut relationship may also be bidirectional in UC. Coexisting depression or anxiety, if undiagnosed or untreated, may contribute to the development of symptoms consistent with IBS in UC patients [27].

Animal models are the primary source of evidence for a reciprocal relationship between the gut and brain in UC. Chronic GI inflammation in mice causes behavioral abnormalities that resemble human mood disorders [28]. Research has shown that inducing depression can trigger colonic mucosal inflammation in mouse models of quiescent colitis [29]. This effect can be reduced by antidepressant medications and may occur through interference with the ability of the vagus nerve to regulate pro-inflammatory macrophage activity [30]. There is also evidence that the serum and mucosa of UC patients produce pro-inflammatory cytokines in response to acute psychological stress [24]. Small retrospective analyses of psychological counseling or antidepressant use have been conducted in UC patients who served as their own controls before and after these interventions. These analyses showed fewer relapses of disease activity and reduced use of glucocorticosteroids after the interventions [31, 32]. In addition, a recent study found that overall depression levels improved in individuals with UC after the initiation of anti-TNF-α or immunomodulator therapy for active disease [33, 32].

3. TYPES OF COLITIS

Ulcerative colitis (UC): This is a chronic inflammatory condition that primarily affects the mucosal lining of the colon and rectum. It is characterized by periods of discomfort, known as flare-ups, and periods of remission. Symptoms include abdominal pain, bloody diarrhea, and urgency to defecate [34].

Crohn's disease: Although it primarily affects the small intestine, Crohn's disease can cause inflammation in any part of the gastrointestinal tract, including the colon. Symptoms may include diarrhea, abdominal pain, fatigue, and weight loss [1].

Ischemic colitis: This occurs when blood flow to the colon is reduced, leading to inflammation and tissue damage. It often presents with sudden abdominal pain and bloody diarrhea, typically in older adults with cardiovascular risk factors.

4. MATERIALS AND WORKING METHODS

Consent was obtained before collecting responses from patients. Specific questions were prepared and given to patients to answer. These included questions about bloating, diarrhea, constipation, gas, shortness of breath, loss of appetite, pain, gender, residence, smoking, marital status, and occupation. Ninety-two individuals with irritable bowel syndrome were included, along with a control group of 18 individuals without the condition [3].

5. RESULTS

Ninety-two patients with colitis were recruited from individuals visiting Baquba Teaching Hospital between August 2025 and January 2026. The patients were asked specific questions to identify signs and symptoms of the disease, and selected laboratory tests were performed. Eighteen individuals without colitis were included as a control group.

Table 1 shows the questions asked of patients and the percentages of responses indicating the presence or absence of symptoms. Seventy-seven patients had symptoms of abdominal distention, representing 83.70%, while 15 patients did not have this symptom, representing 16.30%. This indicates that abdominal bloating is one of the common symptoms associated with irritable bowel syndrome.

Table 1. *Symptoms and characteristics of the patient group*

Variable	With symptom/characteristic	Without symptom/characteristic	With (%)	Without (%)
Distention	77	15	83.70	16.30
Diarrhea	54	38	58.70	41.30
Constipation	58	34	63.04	36.96
Dyspnea	88	4	95.65	4.35
Loss of appetite	23	69	25.00	75.00
Gases	63	29	68.50	31.50
Pain	55	37	60.00	40.00
Gender	32 male	60 female	34.78 male	65.22 female
Smoking	4 smokers	88 non-smokers	4.35	95.65

The second symptom assessed among patients with colitis was the presence of diarrhea or constipation. The table shows that some patients presented with diarrhea, while others presented with constipation, with relatively similar percentages. Diarrhea was reported in 58.70% of patients, while constipation was reported in 63.04%. Shortness of breath was the most common symptom among individuals with colon disease, reported in 95.65% of patients. Regarding the difference between males and females in the incidence of colon disease, the highest incidence in this study was among females, who represented 65.22% of the cases, while males represented 34.78%. Table 3 shows the laboratory tests performed on patients with irritable bowel syndrome and healthy individuals. The table shows significant differences between the patient and control groups.

Table 2, which presents the control group, shows that the symptoms assessed in the patient group were present at much lower percentages among controls. This indicates that these symptoms were more common among patients than among healthy individuals.

Table 3 presents several laboratory tests for patients with irritable bowel syndrome and the control group. A significant difference was observed in body mass index (BMI). Significant differences were also observed between patients and controls in red blood cell count, hemoglobin, and platelet count. The mean RBC value was 3.89 in the control group and 4.78 in the patient group. Statistical analysis showed a significant difference at the 0.05 level. Platelet counts were higher in healthy individuals than in patients, with a mean of 282.55 in healthy individuals and 152.94 in patients.

Table 2. *Symptoms and characteristics of the control group*

Variable	With symptom/characteristic	Without symptom/characteristic	With (%)	Without (%)
Distention	2	16	11.11	88.89
Diarrhea	3	15	16.67	83.33
Constipation	5	13	27.78	72.22
Dyspnea	3	15	16.67	83.33
Loss of appetite	4	14	22.22	77.78
Gases	2	16	11.11	88.89
Pain	4	14	22.22	77.78
Gender	5 male	13 female	27.78 male	72.22 female
Smoking	1 smoker	17 non-smokers	5.56	94.44

Table 3. *Group statistics*

Variable	Health Status	N	Mean	Std. Deviation	Std. Error Mean	Sig.
BMI	Healthy	18	22.00	1.572	0.370	0.001
	Patients	92	29.20	3.903	0.407	
DBP	Healthy	18	71.00	9.828	2.316	0.262
	Patients	92	80.05	8.941	0.932	
DM	Healthy	18	86.50	5.283	1.245	0.000
	Patients	92	156.29	75.248	7.845	
Hb	Healthy	18	9.33	1.138	0.268	0.029
	Patients	92	13.12	1.728	0.180	
PLt	Healthy	18	282.55	63.521	6.622	0.000
	Patients	92	152.94	38.959	9.183	0.000
RBC	Healthy	18	3.89	0.471	0.111	0.000
	Patients	92	4.78	0.768	0.080	0.000
SBP	Healthy	18	115.56	7.048	1.661	0.000
	Patients	92	138.80	17.842	1.860	0.000
WBC	Healthy	18	7.56	1.149	0.271	0.112
	Patients	92	8.64	2.823	0.294	0.009

6. DISCUSSION

This study describes the clinical, behavioral, and demographic characteristics of participants with colon-related disease. Patients with colon disease, particularly those with active disease, frequently report the symptoms mentioned above. Previous studies on colon patients have also examined nutritional measures, such as body mass index and vitamin levels [21].

In this study, we assessed the occurrence and adult prevalence of irritable bowel syndrome among residents. A study conducted among adults in the Kingdom of Saudi Arabia reported that the prevalence of irritable bowel syndrome was approximately 16.30% according to the Rome IV criteria, although it used a different target population. However, only 7.9% of participants in the present study adhered to the Rome IV criteria [23].

In addition, according to the Rome III criteria, prevalence rates of 21.10% and 31.30% were found in two separate studies conducted among Saudi Arabian medical students [8, 35]. Therefore, the higher prevalence in some studies may be due to differences in the target population. One investigation reported that 11.20% of people worldwide have irritable bowel syndrome [22], and the conclusions of the present study are generally consistent with previous research.

Similar to the results of this study, a systematic review of fifty-three studies involving patients from thirty-eight countries using the Rome III criteria reported a pooled prevalence of 9.20% [32]. Other studies, including one from Iran, reported a very low prevalence of 1.11% according to the Rome III criteria [1]. One reason for discrepancies in results may be that Eastern countries use Western diagnostic tools for irritable bowel syndrome that may not fully match the educational and linguistic context of their populations.

Differences in ethnicity, population size, sample variation, and the use of different diagnostic criteria may also contribute to these disparities [1]. There are limited local population-based studies that can serve as reliable indicators for comparison. Age, gender, and socioeconomic factors all influence the prevalence of IBS.

The reported gender and age-group distribution among individuals with IBS symptoms was consistent with findings in the local [8, 35] and international literature [6, 32], with a higher frequency among females. IBS is more prevalent among teenagers and declines with age. According to the present study results, the majority of IBS patients were children or young adults in the 18–30 age group, which is consistent with earlier studies [25]. IBS may be becoming more common among younger people because of psychological and social factors, such as stress, anxiety, and academic challenges [26].

In this study, the level of education appeared to play an important role. The occurrence of IBS increased with higher educational level. This result is close to findings from studies conducted in Egypt and Iran, which showed that IBS is highly prevalent among people with middle levels of education [36, 12]. This may be explained by similar educational environments across the countries discussed. Physical and psychological stress is one of the major factors known to contribute to the development of IBS.

The association between a high level of education and irritable bowel syndrome may be explained by the fact that individuals with higher education may experience considerable stress because of heavy academic workloads. In addition, the number of favorable jobs available to highly educated individuals may be limited, requiring additional effort to obtain suitable employment, which may lead to further stress, anxiety, or frustration. These factors may be associated with irritable bowel syndrome. Irritable bowel syndrome is a diverse clinical condition that can be further classified as IBS-D, IBS-C, or IBS-M. Its prevalence varies by geographic location. Several earlier studies reported that IBS-M is the most common subgroup. Using the Rome IV criteria, the present study also found IBS-M to be the most frequent subgroup, which is consistent with the majority of earlier studies [32].

Compared with the platelet distribution width (PDW) of healthy populations, several researchers have found that individuals with type 2 diabetes mellitus have higher PDW levels [16, 37]. In a retrospective investigation of sepsis patients, PDW levels were found to be higher in deceased sepsis patients than in surviving patients [38]. Inflammatory pathways are involved in the pathophysiology of type 2 diabetes mellitus, coronary artery disease, and sepsis. Similarly, inflammation and IBS are closely associated [5].

An elevated platelet count was noted in a case series of IBD patients experiencing worsening clinical activity in 1968, which was the first indication of a platelet abnormality in IBD [9]. In a meta-analysis of platelet alterations in IBD, platelet count was considerably elevated in both UC and CD groups. The causes of abnormal platelet elevation in IBD patients remain unclear. Plasma thrombopoietin is the primary regulator of platelet formation [7]. Under normal conditions, thrombopoietin levels are negatively associated with platelet formation through a negative feedback process based on platelet count in the blood [10]. It is noteworthy that IBD patients had considerably higher thrombopoietin levels than the general population [2]. However, uncertainty remains because previous studies have shown that platelet count and thrombopoietin levels do not always correlate [31].

This indicates that other regulatory factors may contribute to elevated platelet count in IBD [10]. Numerous investigations have clarified the important role of platelets in linking coagulation and inflammation in both UC and CD, creating a harmful cycle in which contributory factors amplify and spread [8].

The number of visits associated with IBS clearly differed by sex. Men accounted for only 34.78% of IBS visits, whereas women accounted for 65.22%. This shows that IBS-related visits were more common among women than among men. Although BMI, diabetes, RBCs, hemoglobin, and chronic pain syndrome were associated with IBS in the bivariate analysis, they were significant in the adjusted model. For example, one study found that it was often difficult to distinguish pain from other gastrointestinal inflammatory symptoms affecting patients' psychosocial and physical capacities. Therefore, the observed dissociation calls for independent and appropriate pain management to improve the quality of life of IBD patients [22].

Some studies reported that IBS may be more common among men than women. For example, one study found that 16.9% of men and 13.1% of women might have IBS, although the findings were not statistically significant. A Korean study involving 319 sixth-year medical students reported IBS in 41% of men and 25% of women. These findings contradict the present results, which indicate that females are more prone to IBS than males. A Pakistani study also reported that male students were more likely than female students to have IBS symptoms [30]. In contrast, other studies conducted in Pakistan and Malaysia reported opposite findings [3, 39, 40]. Studies reporting a higher female prevalence have linked the condition to healthcare-seeking behavior and a possible association with the menstrual cycle. Studies reporting a lower female prevalence suggested that cultural barriers may prevent female students from reporting the condition [39].

7. CONCLUSION

Compared with prevalence rates reported elsewhere, IBS appears to be relatively uncommon among Iraqi citizens in the present study. Presentations of irritable bowel syndrome were most strongly associated with female gender, higher educational level, lower family income, and employment status. Education, health status, psychological factors, and gender may all have significant effects on the occurrence and presentation of irritable bowel syndrome.

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