

Epidemiology of chronic inflammatory bowel diseases in Djibouti: A cross-sectional study and analysis of immunopathological mechanisms

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ABSTRACT

A retrospective, cross-sectional study was conducted to assess the prevalence, clinical presentation, and diagnostic practices of inflammatory bowel disease (IBD) in Djibouti, using clinical data from four major hospitals in the country. A total of 657 patients with chronic gastrointestinal symptoms were included in the analysis. Results showed that nearly half of the patients (48.5%) presented with symptoms characteristic of Crohn's disease. However, only two patients received a formal diagnosis of IBD, including one confirmed case of ulcerative colitis. Other diagnoses included erosive gastritis, duodenogastric reflux, and villous atrophy. Regarding diagnostic practices, a biopsy was performed in only 26.8% of cases, with a notable gender disparity in biopsy rates. This low frequency of biopsies highlighted a problem of insufficient diagnostic infrastructure. Furthermore, the presence of typical symptoms of Crohn's disease, combined with a low number of confirmed diagnoses, revealed an underdiagnosis of IBD in the country. The underlying immunopathological mechanisms of IBD were also addressed, highlighting abnormal activation of the immune system that leads to chronic intestinal inflammation. These diseases are characterized by excessive immune responses, influenced by environmental and genetic factors. This study highlighted the importance of improving diagnostic tools, increasing awareness among healthcare professionals, and facilitating access to diagnostic procedures such as biopsy, to better manage IBD in Djibouti.

Keywords: Bowel diseases, Crohn's disease, Djibouti, EDiagnosis

Introduction

Inflammatory bowel diseases (IBD), including Crohn's disease (CD) and ulcerative colitis (UC), are chronic conditions

characterized by recurrent inflammation of the gastrointestinal tract [1]. Although these diseases have been extensively studied in industrialized countries, they remain largely underestimated and underrecognized in many resource-limited settings, including some African countries such as Djibouti. The lack of detailed epidemiological data in these regions complicates the understanding of the prevalence, risk factors, and diagnostic challenges of IBD, which hinders patient management and care [2]. Due to the clinical similarity of IBD to other gastrointestinal conditions such as infectious enteritis, parasitic infestations, or celiac disease, patients may be misdiagnosed or undiagnosed, leading to treatment delays and increased morbidity [3-6]. IBD

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represents a major public health problem because, although there is currently no cure for these diseases, proper management can reduce symptoms and flare-ups [7]. Treatments, which include anti-inflammatory drugs such as mesalazine, corticosteroids, immunosuppressants, and biologics, aim to maintain patients in remission [8]. In the most severe cases, surgical intervention, such as colectomy for ulcerative colitis or resection for Crohn's disease, may be necessary [9]. However, early diagnosis and access to care remain important challenges, particularly in regions like Djibouti, where healthcare infrastructure is limited. Despite growing global awareness, data regarding IBD in African countries remain scarce [10]. Djibouti, a country located in the Horn of Africa, represents a special case due to its low level of resources for IBD diagnosis and treatment. The country's healthcare facilities face a shortage of specialists, limited diagnostic infrastructure, and insufficient medical tools to identify these complex diseases [11, 12] accurately. As a result, patients may experience delayed treatment, and IBD management remains inadequate. In this context, it is imperative to understand better the prevalence of IBD, as well as local diagnostic practices, in order to develop appropriate and effective public health strategies.

The main forms of IBD, Crohn's disease and ulcerative colitis, are distinguished by notable clinical differences [13-15]. Ulcerative colitis affects only the innermost layer of the colon and rectum, while Crohn's disease can affect any part of the gastrointestinal tract, from the mouth to the anus, often in multiple locations simultaneously [16]. Furthermore, Crohn's disease generally presents with deeper and more patchy inflammation than ulcerative colitis. Symptoms common to both diseases include abdominal pain, chronic diarrhea often accompanied by blood or mucus, weight loss, fatigue, and fever [17, 18]. While ulcerative colitis is generally more associated with bleeding and urgency, Crohn's disease can lead to complications such as strictures, fistulas, and, in some cases, malabsorption [19].

In industrialized countries, the prevalence of IBD is steadily increasing, a phenomenon also observed in developing countries [20, 21]. Africa, and particularly East Africa, is experiencing a worrying increase in the number of cases, although our understanding of this phenomenon is still incomplete [22]. Studies suggest that environmental factors such as urbanization, dietary changes, and changes in the gut microbiota, in addition to genetic predispositions, are contributing to this resurgence of IBD in previously less affected populations [23, 24]. However, these data remain limited in Africa, and Djibouti is no exception. The lack of reliable epidemiological data on IBD in Djibouti prevents accurate mapping of the disease in the country. Indeed, the difficulties encountered in collecting quality data, the lack of gastroenterology specialists, and the inadequacy of appropriate diagnostic tools make the study of these pathologies particularly complex. However, it is essential to assess the local burden of the disease to plan public health interventions better, allocate adequate medical resources, and introduce appropriate prevention strategies [25, 26].

This study aims to fill this gap by providing a first systematic epidemiological assessment of IBD in Djibouti. In addition to describing the prevalence of IBD and the clinical characteristics of patients, this study will also focus on the underlying mechanisms of these diseases. The immunological mechanisms involved in IBD remain complex and vary from patient to patient, but dysfunctions in the immune system, interactions between the gut microbiome and the host, as well as environmental factors, are known to play a basic role in the development and progression of the disease. By analyzing a cohort of patients suffering from gastrointestinal symptoms, this study attempts to highlight the clinical indicators suggestive of IBD, while exploring the diagnostic challenges specific to Djibouti and the immunopathological mechanisms of the disease. The ultimate goal is to understand better the etiopathogenic factors of these conditions in the Djiboutian context and to provide recommendations for more effective and early patient management. Using data collected from four major hospitals, this research represents the first hospital-based assessment of IBD in Djibouti and will identify key epidemiological trends while analyzing the immune and environmental mechanisms underlying these pathologies.

Materials and Methods

Objective

This study aimed to examine the epidemiology of inflammatory bowel disease (IBD) in Djibouti, assessing the prevalence, clinical presentation, diagnostic practices, and the use of biopsies in the management of these diseases using hospital-based data. It also sought to determine factors associated with a formal diagnosis of IBD, with an emphasis on access to diagnostic tools and specific challenges in Djibouti.

Study design

This study adopted a retrospective, descriptive, and cross-sectional design, using hospital-based data collected from medical facilities across all six regions of the Republic of Djibouti. These hospitals serve as referral sites for both urban and rural populations, allowing for the creation of a comprehensive national profile of patients with gastrointestinal symptoms.

Study population

The study population included 657 patients with chronic gastrointestinal symptoms, such as abdominal pain, persistent diarrhea, significant weight loss, and vomiting. The records included in the analysis contained complete information regarding age, sex, clinical indications, endoscopy results, and biopsy status. Patients with a history of intestinal surgery or other serious pathologies unrelated to IBD were excluded from the study [27, 28].

Data collection

Data were collected from the databases of participating hospitals, with all patients' personal information anonymized to ensure confidentiality. Diagnostic criteria for IBD were established based on reported clinical symptoms, including chronic diarrhea, weight loss, abdominal pain, and vomiting. Diagnostic information was extracted from endoscopy and pathology reports, allowing the identification of cases of Crohn's disease (CD) and ulcerative colitis (UC), as well as other differential diagnoses. These data were entered into a master Excel spreadsheet for subsequent management and analysis [29-31].

The main variables studied included

- Clinical symptoms: abdominal pain, chronic diarrhea, vomiting, and weight loss.
- Diagnostic findings: endoscopy and biopsy reports.
- Demographic characteristics: age, sex, and other relevant data.

Statistical analysis

The analyses were performed using R-based software, which allowed for descriptive analyses, frequency distributions, and cross-tabulations to assess the relationship between symptoms, diagnoses, and biopsy use [32]. Data were processed and analyzed using descriptive statistical methods, such as means, standard deviations, and percentages, to describe patient demographic and clinical characteristics. Fisher's exact test was used to examine significant differences between groups, particularly by sex and access to biopsies. The primary objective of the statistical analysis was to determine factors associated with a formal diagnosis of IBD, with a focus on the prevalence of misdiagnosis, diagnostic barriers, and trends in the use of diagnostic tools such as endoscopy and biopsy.

Sampling method

The patient sample was selected retrospectively from available medical records at the participating hospitals. This study did not involve random sampling, but rather used an available sample of patients who consulted for chronic gastrointestinal symptoms. The sample size (657 patients) was deemed sufficient to provide a representative analysis of IBD patients in the various healthcare facilities in Djibouti. Data were obtained exhaustively for this period to ensure the robustness of the results.

Ethics statement and ethical considerations

This study was conducted in accordance with the fundamental ethical principles of biomedical research, in accordance with the Declaration of Helsinki and local clinical research standards. Prior to data collection, ethical approval was obtained from the ethics committee of the healthcare institutions involved in the study. Participants were informed of the research objectives, the confidentiality of their data, and their right to anonymity.

Informed consent was obtained from each patient prior to inclusion in the study. No identifiable data were used in the published results, thus ensuring the protection of patient privacy. Furthermore, the researchers are committed to the principles of scientific integrity and transparency throughout the study to ensure the rigor and reliability of the results obtained.

Study limitations

This study has several limitations. First, due to its retrospective nature, the information collected is based on medical records that may be incomplete or inaccurately documented. Furthermore, the limited use of biopsies and other diagnostic tools may have influenced diagnostic accuracy. Finally, although the study covered a representative sample of hospitals in Djibouti, it does not allow for extrapolation of the results to the entire population due to the hospital sample [33, 34].

Study impact

The results of this study are essential for understanding the epidemiology of IBD in Djibouti and identifying diagnostic and clinical barriers that could affect patient care. Furthermore, disease mechanisms were addressed. These data will serve as a basis for informing future public health policies and guiding investments in the diagnostic infrastructure necessary for the effective management of IBD patients.

Results and Discussion

The study results showed that of the 657 patients included, 52.1% were women and 47.9% were men. The majority of participants were between 31 and 60 years of age, representing 63.4% of the sample, followed by patients under 30 (22.8%) and those over 60 (13.8%). The mean age of patients was estimated at 45.3 years, with a standard deviation of ± 9.4 years. In terms of gender distribution, it was observed that slightly more women underwent a biopsy (51 women versus 35 men). This difference, although modest, was indicative of a general trend in the frequency of biopsies between the sexes.

Regarding the reported clinical symptoms [35, 36], the three most common indications were chronic diarrhea accompanied by weight loss (**Figure 1**), which was observed in 60 patients (9.1%), followed by epigastric pain combined with chronic anemia (50 patients, 7.6%) and heartburn accompanied by epigastric pain (49 patients, 7.5%). These symptoms were the most common among the patients analyzed, with other gastrointestinal symptoms such as persistent abdominal pain, chronic vomiting, and repeated epigastric pain, collectively accounting for 75.7% of cases.

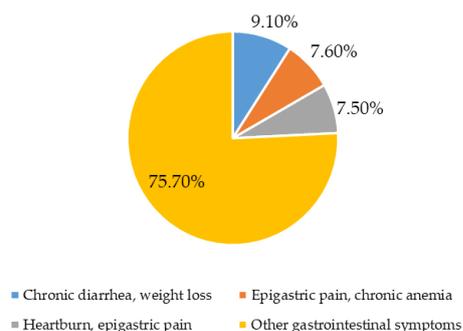


Figure 1. Most frequent clinical indications.

Regarding the diagnostic results obtained by endoscopy and histopathology (Table 1), it was noted that among the patients with symptoms consistent with Crohn's disease, 75 were diagnosed with erosive gastritis and duodenogastric reflux, while another 65 showed signs of villous atrophy, suggesting the possibility of celiac disease. In addition, 285 patients were diagnosed with esophagitis or gastroesophageal reflux disease, which was the most frequently observed diagnosis in this group.

Other conditions, such as intestinal polyps or neoplasms (15 patients), were also detected, although in a much smaller proportion. One case of ulcerative colitis was formally confirmed, and only two patients received a confirmed diagnosis of IBD, including one case of ulcerative colitis [37]. The remaining patients were diagnosed with other conditions, including non-IBD gastric disorders such as gastritis, gastroesophageal reflux disease, and celiac disease, highlighting the difficulty of establishing an IBD diagnosis, despite the clinical presentation of characteristic symptoms [38]. Regarding biopsy, only 26.8% of patients (n = 176) underwent a biopsy. This biopsy rate is considered low, given the reported clinical symptoms. It was noted that women were slightly more likely to undergo a biopsy than men (51 women vs. 35 men). This difference was statistically significant, highlighting a possible sex bias in diagnostic decisions. Biopsy results showed that in cases where biopsies were performed, patients presented with a variety of findings, ranging from benign conditions such as gastritis and reflux to more serious conditions such as celiac disease.

Table 1. Endoscopic findings and biopsy status.

Diagnostic Category	Number of Patients (%)
Endoscopic data	
Erosive Gastritis, Duodenogastric Reflux	75 (11.4 %)
Villous Atrophy (Celiac Disease)	65 (9.9 %)
Esophagitis / Reflux-Related Diseases	285 (43.3 %)
Ulcer / Polyps / Neoplasia	15 (2.3 %)
Ulcerative Colitis (UC)	9 (1.4 %)
Other Unclassified Diagnoses	23 (3.5 %)
No Pathology Detected	20 (3.0 %)
Biopsy Status	
Biopsy Performed	176 (26.8 %)
No Biopsy	481 (73.2 %)

The results of the cross-analysis of inflammatory bowel disease (IBD) diagnostic categories versus the most common clinical indications, presented in Table 2, revealed specific associations between clinical symptoms and the diagnoses obtained. Celiac disease was mainly associated with symptoms of chronic diarrhea and malabsorption, with 66 patients (10.1%) suffering from these symptoms. No other complaints, such as epigastric pain or anemia, were reported in this group, showing that celiac disease usually presents with specific digestive symptoms. In contrast, reflux-related diseases, such as esophagitis and gastroesophageal reflux disease, were largely associated with symptoms of epigastric pain and reflux, which is consistent with clinical expectations for these conditions [39]. These symptoms were observed in 96 patients, and although symptoms such as anemia and dysphagia were present, they were less frequent. This shows

that reflux-related diseases can cause more varied symptoms, including systemic signs such as anemia. Gastritis showed a wide variety of symptoms, including epigastric pain (101 patients) and anemia (63 patients), reflecting its potential to cause more complex digestive disorders. In contrast, hemorrhoids were mainly associated with anorectal symptoms such as bleeding, while intestinal polyps and neoplasms were mainly linked to dysphagic symptoms and gastrointestinal bleeding [40]. Finally, ulcerative colitis was diagnosed in only 9 patients, and none of them presented with classic symptoms such as epigastric pain or anemia, suggesting a later identification of this condition. The p-value of 0.0038 indicates that these associations are statistically significant, confirming the relationship between certain diagnoses and specific symptoms.

Table 2. Cross-tabulation of results with clinical indications.

Category	Chronic Diarrhea / Malabsorption	Abdominal / Epigastric Pain	Anemia	Dysphagia	Heartburn / Reflux	Other	Suspected Tumor	Upper GI Bleeding	Vomiting / Nausea
Celiac Disease	66	0	0	0	0	0	0	0	0
Esophagitis / Reflux Disease	5	88	12	11	96	8	2	5	60

Gastritis	13	101	63	5	8	8	0	8	3
Hemorrhoids	2	0	0	0	0	9	0	11	0
Normal	2	1	0	0	2	5	0	1	0
Polyps / Neoplasia	1	4	0	6	0	2	0	1	1
Ulcerative Colitis	1	0	0	0	0	1	0	0	0
Unclassified	7	18	4	9	1	4	1	8	2

(*) Fisher's Exact Test (simulated, B = 10000): p-value = 0.0038

Another important analysis was the cross-tabulation of biopsy results with patient sex (**Figure 2**). It was observed that women were more frequently diagnosed with conditions such as gastritis and esophagitis, while men were more likely to be diagnosed with reflux-related disorders. This difference was statistically significant ($p = 0.0038$), which could suggest a trend toward better diagnostic management in women, or bias in diagnostic decisions based on sex. Interestingly, the difference was not as marked for conditions such as polyps and neoplasms, where men and women were diagnosed in similar proportions [41].

Analysis of clinical indications by sex revealed interesting trends (**Figure 3**). Women showed a greater frequency of symptoms of chronic diarrhea and weight loss (33 women vs. 27 men), and epigastric pain accompanied by anemia (30 women vs. 20 men). These results are consistent with clinical knowledge that women may be more likely to experience chronic digestive symptoms, while men have a higher frequency of symptoms related to gastroesophageal reflux, including epigastric pain and chronic vomiting [42]. Symptoms of vomiting and unexplained weight loss were also more common in men, which may suggest a difference in the clinical presentation of gastrointestinal disorders according to sex. The p-value of 0.001 obtained for this analysis shows that the distribution of symptoms by sex is statistically significant.

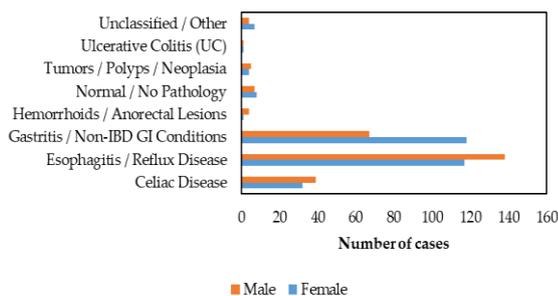


Figure 2. Cross-tabulation of biopsy results with gender.

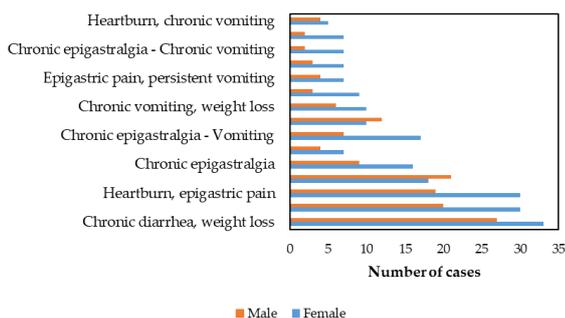
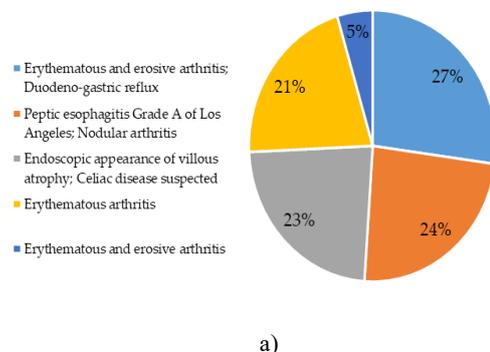
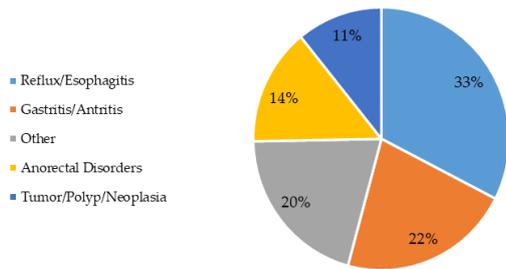


Figure 3. Cross-tabulation of clinical indications with gender.

The study of symptoms in patients with Crohn's disease revealed a variety of clinical signs affecting both the joints and the gastrointestinal system (**Figure 4a**). Among the patients, 76 presented with erythematous and erosive arthritis in association with duodenogastric reflux, while another 67 presented with symptoms of grade A esophagitis, accompanied by nodular arthritis. Furthermore, 65 patients presented with villous atrophy visible during endoscopy, which raised the suspicion of celiac disease. In addition, 59 patients had erythematous arthritis without other associated manifestations. This diversity of symptoms in patients with Crohn's disease reflects the complexity of the disease, which can affect not only the digestive system but also the joints, a phenomenon frequently observed in systemic inflammatory diseases [43]. In contrast, in patients without Crohn's disease (**Figure 4b**), the symptoms were generally simpler and mainly limited to gastrointestinal disturbances. Among them, 27 patients presented with symptoms of reflux or esophagitis, while 18 others suffered from gastritis and antritis. Other symptoms were less common, including anorectal disorders observed in 12 patients, as well as intestinal polyps or neoplasms, diagnosed in 9 patients. These results show that patients without Crohn's disease tend to present with isolated gastrointestinal symptoms, without the extraintestinal manifestations frequently found in patients with Crohn's disease [44]. In short, Crohn's disease causes a wider range of symptoms affecting the digestive system and joints, while gastrointestinal disorders in patients without Crohn's disease are often limited to isolated conditions.



a)



b)

Figure 4. Analysis of clinical symptoms in patients with Crohn's disease and in non-Crohn's patients. a) Symptoms of Crohn's disease patients. b) Symptoms in Non-Crohn patients

Analysis of the most common clinical indications reveals frequent gastrointestinal symptoms in patients, which vary depending on their clinical presentation. Among the most common symptoms,

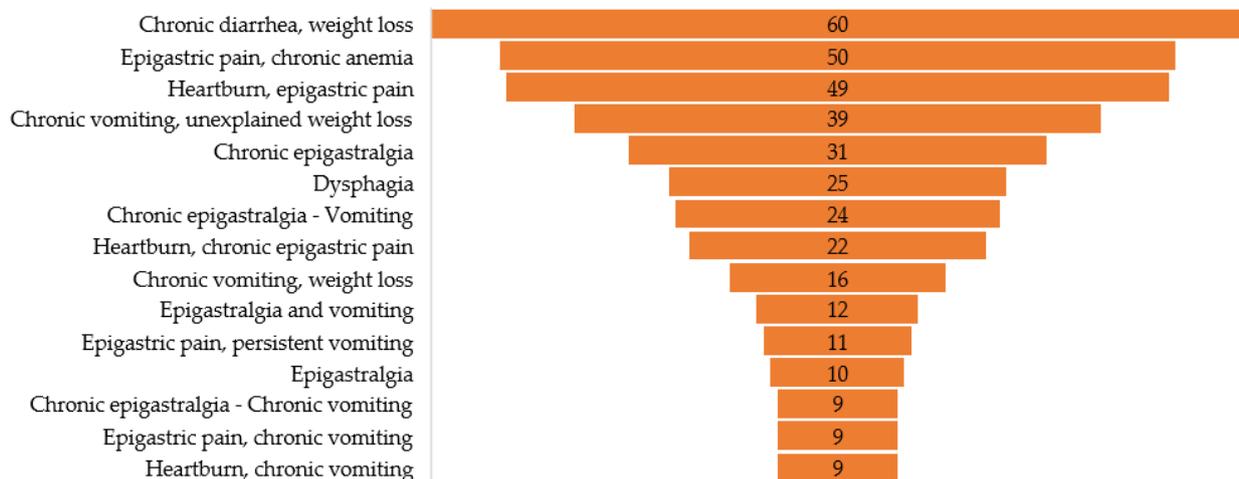


Figure 5. Common clinical indications.

This study of 657 patients with gastrointestinal symptoms in Djibouti provides valuable information regarding the epidemiology of inflammatory bowel diseases (IBD), particularly Crohn's disease (CD) and ulcerative colitis (UC). A key finding of this study is the high proportion of patients who presented with symptoms of Crohn's disease, including chronic diarrhea, weight loss, vomiting, and abdominal pain. However, formal diagnoses of IBD were very low, with only two patients diagnosed with IBD, including one case of ulcerative colitis. This discrepancy highlights the importance of underdiagnosis of inflammatory bowel diseases, a particularly significant problem in resource-limited settings such as Djibouti. Several factors may explain this underdiagnosis. One of the main ones is the limited availability of endoscopy and histopathology services, which are essential for accurate diagnosis. Furthermore, a lack of awareness among frontline healthcare professionals about IBD, as well as sociocultural barriers that hinder access to care, may also play a significant role [46]. Diagnostic confusion is also fueled by the presence of overlapping diseases, such as celiac disease, infections, and nonspecific colitis [47]. Symptoms of celiac

chronic diarrhea accompanied by weight loss (60 patients) and epigastric pain associated with chronic anemia (50 patients) stand out as the main reasons for consultation. These symptoms suggest serious digestive disorders that can affect nutrient absorption and lead to malnutrition. Heartburn accompanied by epigastric pain (49 patients) follows closely, which is typical of disorders related to gastroesophageal reflux. Other common symptoms include chronic vomiting accompanied by unexplained weight loss (39 patients), which could be indicative of serious inflammatory or obstructive conditions of the gastrointestinal tract. Less frequent symptoms, such as dysphagia (25 patients), epigastric pain associated with vomiting (24 patients), and persistent epigastric pain accompanied by vomiting (11 patients), suggest more complex functional or organic disorders. These data indicate that gastrointestinal disorders can present with multiple, often associated, symptoms, requiring in-depth management to establish an accurate diagnosis [45].

disease have been observed in patients suspected of having Crohn's disease, suggesting a high risk of misdiagnosis or overlapping pathologies, as these two conditions share similar gastrointestinal manifestations [48]. The results of this study also show a predominance of symptoms in female patients, particularly with regard to the use of biopsies, where women showed higher rates than men [49]. Despite this difference, the biopsy rate remains insufficient, given the severity of the symptoms observed. This highlights the importance of improving diagnostic practices to avoid misinterpretation of the disease and ensure that patients receive appropriate treatment in a timely manner [50]. The age-specific analysis revealed that Crohn's disease symptoms are predominantly present in patients aged 31 to 60 years, an age distribution that is also consistent with global IBD data. This phenomenon suggests that the onset of Crohn's disease in this age group is similar to that observed in other regions of the world, implying that environmental, social, and genetic factors may play a role in the incidence of this disease in African populations [51]. The results of this study also suggest that current diagnostic practices in Djibouti are insufficient to

determine the true epidemiology of IBD, creating an opportunity to improve early disease detection and patient treatment [52]. The lack of access to advanced diagnostics and low awareness of these conditions highlight the need to improve healthcare infrastructure, while training healthcare professionals to recognize IBD symptoms and use appropriate diagnostic tests. The immunopathological mechanisms of inflammatory bowel diseases (IBD) are complex and involve an interaction between genetic, environmental, and immune factors [53]. Genetic factors play a key role, as demonstrated by the familial aggregation of IBD, which is more pronounced in Crohn's disease than in ulcerative colitis. Genetic susceptibility is particularly strong in monozygotic twins, with significantly higher concordance rates for Crohn's disease compared to ulcerative colitis [54]. These data suggest that a hereditary factor contributes significantly to the pathogenesis of these diseases, particularly in early-onset forms of the disease. Genetic mutations affecting the function of the XIAP gene and the NOD2 gene, involved in the regulation of intestinal inflammation, are frequently observed in patients with Crohn's disease [55]. These mutations impair the innate immune response and antimicrobial defense, creating a favorable environment for chronic inflammation. Environmental factors, including diet and smoking, also play an important role in the onset and progression of IBD [56]. Smoking is particularly harmful for patients with Crohn's disease, while it appears to have a protective effect in those with ulcerative colitis. Diets high in saturated fat and processed meats are associated with an increased risk of developing these diseases, while a high-fiber diet appears to have a protective effect, due to the production of short-chain fatty acids, which have anti-inflammatory properties [57]. The gut microbiome is also a key factor in the pathogenesis of IBD [58]. Patients with IBD often exhibit microbial dysbiosis, characterized by a reduction in short-chain fatty acid-producing bacteria, such as *Faecalibacterium prausnitzii* [59], and an increase in Proteobacteria, including *Escherichia coli* [60], which can disrupt the intestinal barrier and induce inflammatory responses. This alteration of the microbiome worsens intestinal permeability, allowing bacteria and luminal antigens to penetrate the intestinal mucosa, triggering an abnormal immune response [61]. Intestinal barrier cells, including Paneth cells and goblet cells, play a central role in protecting against inflammation. Defects in their function, such as those observed in patients with Crohn's disease, lead to reduced antimicrobial production and impaired epithelial regeneration. Autophagy dysfunction and mutations in the ATG16L1 gene affect the ability of Paneth cells to eliminate microbes, contributing to the chronic inflammation observed in Crohn's disease [62, 63].

To better understand the prevalence of IBD in Djibouti and improve diagnostic strategies, prospective studies are needed. These studies could not only assess the incidence of IBD in this region, but also explore the interactions between genetic and environmental factors, such as diet and antibiotic use, which can modulate the gut microbiome. Furthermore, it is fundamental to

study the conditions of coexistence between IBD and other gastrointestinal disorders in an endemic context.

Conclusion

This study shed important light on the epidemiology of inflammatory bowel disease (IBD) in Djibouti, revealing a high proportion of patients with symptoms consistent with Crohn's disease, but a low rate of formal diagnosis. Underdiagnosis of IBD in this setting is primarily due to limitations in access to advanced diagnostic tools, lack of awareness among healthcare professionals, and sociocultural barriers preventing optimal access to care. Observed symptoms, such as chronic diarrhea, weight loss, and abdominal pain, are common, but diagnostic challenges are exacerbated by overlapping conditions, such as celiac disease and gastrointestinal infections. The study highlights the need to improve healthcare infrastructure and increase physician awareness of IBD. The suboptimal use of biopsies, despite the severity of symptoms, shows that better access to diagnostic techniques, such as endoscopy and histopathology, is essential for adequate patient management. The immunopathological mechanisms of IBD, involving genetic, environmental, and microbial factors, offer new avenues for better understanding these diseases and developing targeted treatments. In conclusion, this study highlights the urgent need to improve diagnostic and therapeutic practices in Djibouti, as well as the need for additional research on the prevalence and risk factors of IBD. A better understanding of these pathologies could not only improve patient outcomes in Djibouti but also enrich knowledge about IBD in resource-limited settings.

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